AVIATION WEEK

A McGRAW-HILL PUBLICATION

JUNE 6, 1955

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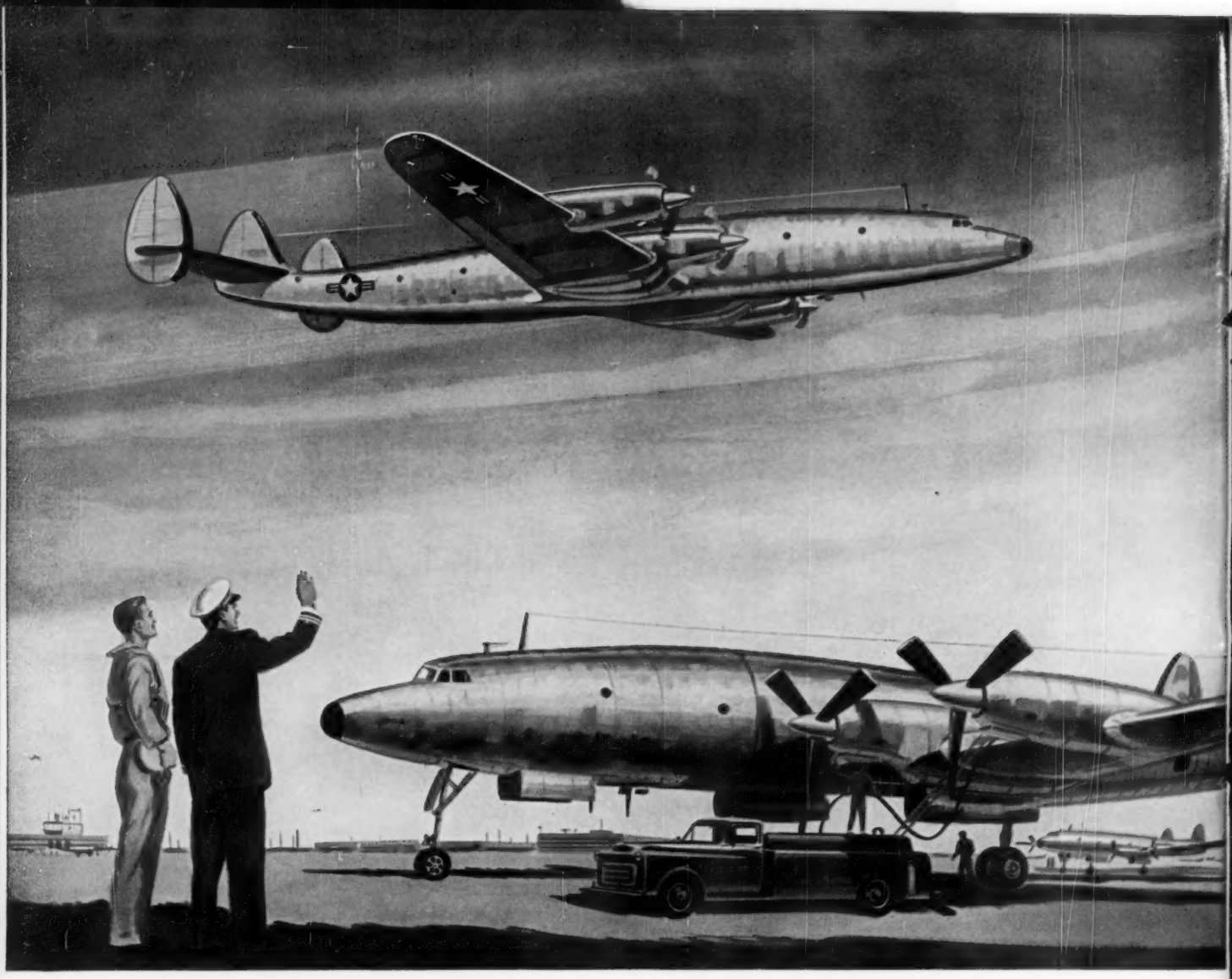

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The Holley gas turbine control is the result of intensive research and development to provide a light weight, compact means of accurately metering fuel consistent with engine requirements.

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Phillips 66
PRESENTS

...IN AVIATION

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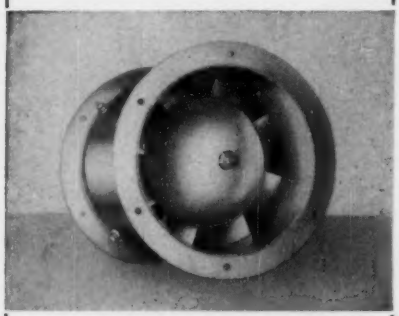

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Aviation Week

JUNE 6, 1955 VOL. 62, NO. 23

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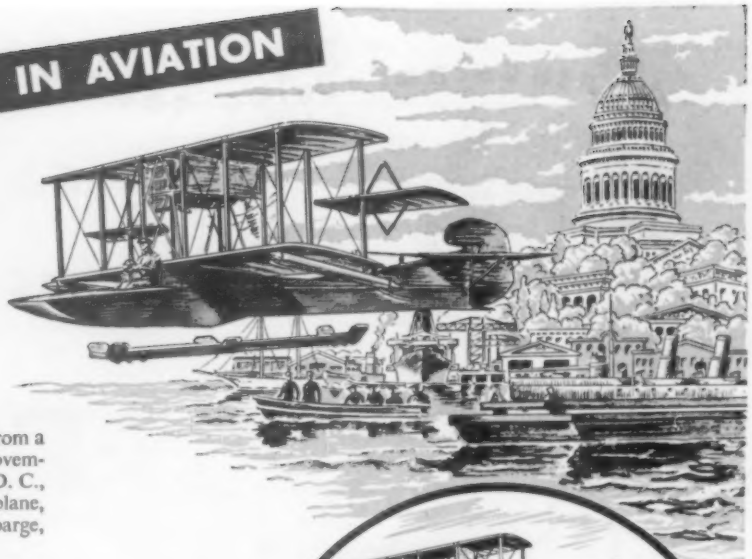
Phillips 66
PRESENTS

MILESTONES IN AVIATION

Full Steam Ahead



That the catapult method of launching aircraft from a ship could be practical was demonstrated on November 12, 1912, in the Navy Yard at Washington, D. C., when a blast of compressed air propelled a plane, carried on a cradle, along a track laid on a barge, and into the air.

In November of 1915, a Curtiss *F-boat* took off on the first successful catapult launching from a battleship deck. In 1916, the catapult launching device was made standard equipment of the Atlantic Fleet. Since then, catapult-launched aircraft have proved themselves invaluable to our Navy.

Activating power has moved from compressed air through shell blasts and hydraulic pressure to steam. With the arrival of jet aircraft, the catapult became the standard method of launching planes from decks of carriers. Today, steam from the ship's boilers provides safe power for speedy launching of aircraft from all U. S. Navy carriers.

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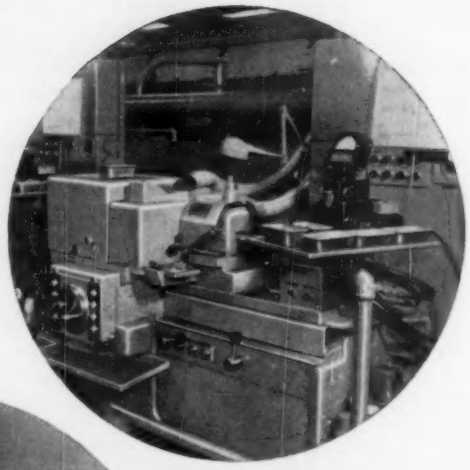

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NEW DEPARTURE

BALL BEARINGS

NOTHING ROLLS LIKE A BALL

NEWS DIGEST

Domestic

Douglas Aircraft Co. delivered Eastern Air Lines' first DC-7B last week, following acceptance of two overwater versions by Pan American World Airways and type certification by Civil Aeronautics Administration. EAL will put the 410-mph. transport into New York-Miami service July 15. It will take delivery on the second and third aircraft June 15 and June 28. PAA flew its two DC-7Bs to Miami for minor modifications and will start North Atlantic flights June 15. Both versions are powered by Wright Turbo Compound R3350-DA4 engines. The overwater airliner, equipped with saddle tanks, has a nonstop range of 5,120 miles. Douglas reported the DC-7B's guaranteed gross takeoff weight was increased to 126,000 lb. from 125,000 lb.; takeoff length cut to 6,100 ft. from 6,500, and landing length reduced to 5,800 ft. from 5,990 ft.

Marquardt Aircraft Co. turned down informal offers by United Aircraft Corp. to merge the smaller firm into UAC's organization. ". . . The best interests of the corporation for growth and development in its areas of interest for defense production lie in continuing Marquardt's activities as an independent entity," the company's management said, " and negotiations looking toward a merger with United Aircraft Corp. should not be pursued."

Pastushin Aviation Corp. received a $1,939,000 contract from Douglas Aircraft Co. to produce jettisonable fuel tanks for the A4D, F4D, F3D, and AD-5 and AD-6. The 300-gal. 16-ft-long tanks were designed by Douglas.

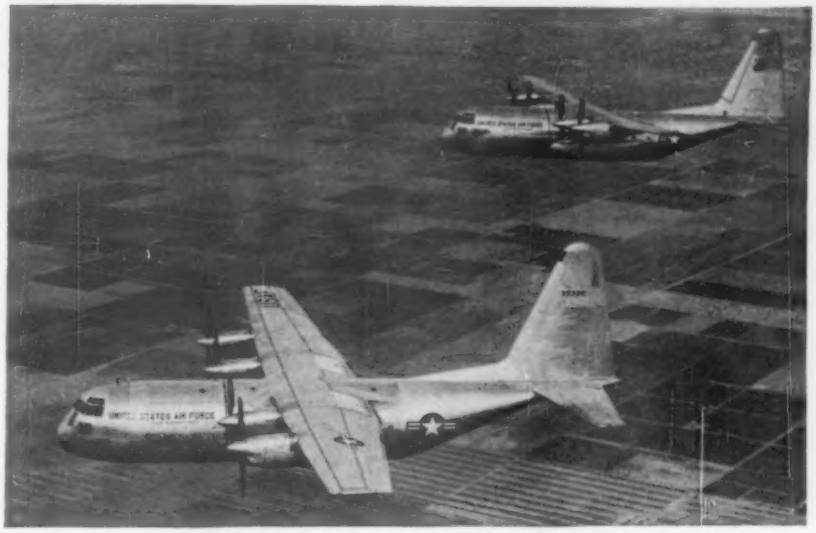
Air Carrier Service Corp. signed a contract with Capital Airlines to sell CAP's DC-4 fleet as turboprop Vickers Viscounts are delivered.

Trans World Airlines inaugurated nonstop first-class flights between New York and San Francisco June 1 with Lockheed 1049G Super Constellations.

Temco Aircraft Corp. won a subcontract from North American Aviation to produce F-100D wingtip panels, inboard and outboard ailerons and flaps. Total value of the award: more than $1 million.

United Air Lines converted nine first-class Douglas DC-6s to 72-passenger aircoach configuration.

Dumont Aviation Associates purchased Industrial Associates, Inc., and is moving the firm's entire manpower and physical assets from Los Angeles International Airport to Long Beach, where it will operate as a division of Dumont.



Lockheed Tests Two C-130s

Two prototypes of Lockheed Aircraft Corp.'s turboprop C-130 Hercules get into the air together for the first time. First prototype (background) is being tested at a gross weight of 54 tons. Second (foreground) is undergoing electronics and power checks. Production USAF transports are rolling from Lockheed-Georgia.

Financial

Rohr Aircraft Corp., Chula Vista, Calif., earned a $2,161,000 net profit during the nine months ended Apr. 30, compared with $2,645,000 for the same period last year. Sales dropped to $61,612,000 from $77,496,000. Current backlog: more than $121 million.

North Central Airlines had a net profit of $19,032 for the first four months of 1955, compared with a $228,433 loss during the comparable period last year.

Century Engineers, Inc., Burbank, Calif., reported a backlog of $6 million.

Chance Vought Aircraft, Inc., Dallas, declared a 40-cent dividend, payable June 28 to stockholders of record June 10.

International

Russian Air Force is taking steps to produce refueling tankers for its jet bombers, according to Krasnaya Zvezda, daily newspaper of the Soviet Ministry of Defense. An article written by Engineer-Major T. Rusyantsev said the tanker will be "equivalent in type to jet bombers."

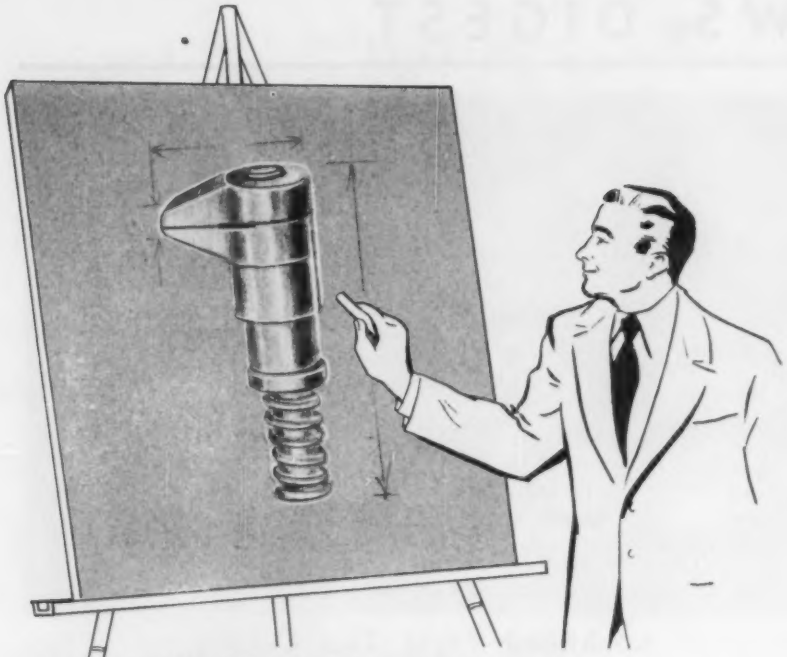
First F-86K Sabre to be assembled for NATO by Italy's Fiat made its initial test flight at Torino. The aircraft was put together from parts shipped to Fiat by North American Aviation. Similiar to the F-86D, NATO's all-weather interceptor is armed with four 20-mm. cannon instead of rockets and carries a North American-designed MG-4 fire control system.

Queen Charlotte Airlines turned down an offer by Pacific Western Airlines, its rival in Canada's British Columbia, to buy QCA for an estimated $800,000.

Royal Australian Navy plans to re-equip two fleet squadrons with turboprop-powered Fairey Gannets and one with de Havilland's jet Sea Venom. The new aircraft will be delivered to Australia in May 1956.

Air Vice Marshal Sir Francis Mellersh, 56, retired World War II commander of RAF's Strategic Air Force, Eastern Air Command, was killed in a helicopter accident May 25 at Chichester, Sussex, England.

Trans-Canada Air Lines Lockheed Super Constellation flew from London to Montreal in 10 hr. 55 min., setting a new TCA record for the 3,375-mile route. Average speed: 335 mph.



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June 6, 1955

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WHO'S WHERE

In the Front Office

William B. Bergen, executive vice president of Glenn L. Martin Co., Baltimore. In addition to his new duties, Bergen will also continue in his position as vice president-operations.

Paul E. Hovgard, vice president-research, development and engineering, Kellett Aircraft Corp., Camden, N. J.

Harry A. Sosnoski, aviation advisor to the president of Olin Mathieson Chemical Corp., New York, which has substantial interest in Marquardt Aircraft Co. and Reaction Motors, Inc.

Honors and Elections

M. W. McLeod, Trans-Canada Air Lines, received the 1954 McCurdy Award at the Canadian Aeronautical Institute's second annual meeting in Toronto.

Changes

Dr. Bernard Kopelman, chief engineer of Sylvania Electric Products' Atomic Energy Division, Bayside, N. Y.

Richard G. Bowman, assistant chief engineer-production, Republic Aviation Corp., Farmingdale, N. Y. Other new assistant chief engineers: **Dr. William J. O'Donnell,** development and experimental, and **Robert L. Bortner,** administration.

Adolph Burstein, assistant chief engineer, and **S. G. Frank Haas, Jr.,** chief development engineer, Convair-San Diego.

E. Glenn Gorman, director of Houdaille-Hershey Corp.'s aviation plants and products. Other changes: **Robert D. Fagely,** manager of the company's new aviation engineering laboratory at Pasadena, Calif., and **Clarence S. Sorensen,** consulting engineer.

J. Franklin Mellema, administration manager of Ford Motor Co.'s Aircraft Engine Division, Chicago.

Harry V. Kerker, manager of Oakite Products' new Export Division, New York, N. Y.

Arlindo Moura, U.S. general manager for Brazilian International Airlines.

Ted H. Ostermann, U.S. sales manager for Lufthansa German Airlines. Also appointed: **Karl H. Hollmann,** sales promotion manager; **Hellmuth K. Dippel,** sales supervisor.

Morris Silverman, advertising sales promotion manager, Barry Controls, Inc., Watertown, Mass.

Walter A. Keller, purchasing agent for Parker Appliance Co.'s Engine Accessories Division, Cleveland; **Kent Hawkins,** staff engineer.

Carl J. Gilson, aviation sales manager for A A Metal Products, Inc.; **James Madrid,** production manager.

Vernon E. Hupp, Jr., assistant service manager of United Aircraft Service Corp. for Hamilton Standard products.

J. Gregg Stephenson, assistant supervising engineer of the applied electronics section of Airborne Instruments Laboratory's Research and Engineering Division, Mineola, N. Y.

INDUSTRY OBSERVER

► Aircraft Industries Assn. has proposed to the Department of Defense that the original manufacturer be permitted to pay for the purchase of surplus aeronautical equipment by giving the government a credit which would be applied as an offset to current contract payments covering new sales of his products to the military.

► **Approximately 10% of Navy aircraft overhaul program in Fiscal 1956 will be done by private contractors. Navy plans to overhaul a total of 1,991 combat type aircraft at an estimated average unit cost of $52,035. This compares with 1,769 aircraft overhauls in Fiscal 1955 at an average unit cost of $55,022.**

► Development of North American's tri-sonic tunnel test section is under way at Ohio State University's aerodynamic laboratory. Tests made in Ohio State's blowdown supersonic tunnel have included force and pressure distribution work on the North American F-100 Super Sabre and development of ventilated walls for reducing shock wave interference in the test section.

► **Navy had only 268 aircraft equipped with afterburners as of Mar. 1, 1955.**

► De Havilland plans to fly and at the same time start water tank tests on a fully-modified Comet II this summer, perhaps in time for the Farnborough show. De Havilland also hopes to flight test the first 58-to-76 passenger, 500 mph. Comet IV in 1957 with first commercial delivery to British Overseas Airways Corp. in 1958.

► **Air Force is seeking $104 million in Fiscal 1956 for auxiliary fuel tanks which will bring USAF up to 70% of its present tank requirement. Costs range from $156 for a 200-gal. tank used in an F-86 to $5,500 for a 1,700-gal. tank.**

► Bristol hopes to have the 4,800-lb. thrust version of the Orpheus engine ready for the Folland Gnat in time for the Farnborough show in September. Orpheus also is scheduled for use in the Fiat G-91, the Breguet Taon and the Dassault Mystere 26.

► **Average cost per hour of operating Navy aircraft will increase from $23.56 in Fiscal 1954 to $43.79 in Fiscal 1956. Reason: Navy will have a larger proportion of jet aircraft which burn more fuel per hour.**

► Napier & Son, Ltd., is interested in establishing arrangements with an American engine manufacturer for the production of the Eland engine under license in the U.S. Napier estimates that the Convair-Liner can be converted to the Eland turboprop for $200,000 to $240,000 in small numbers, and for considerably less in quantity. Engine cost is calculated at $160,000.

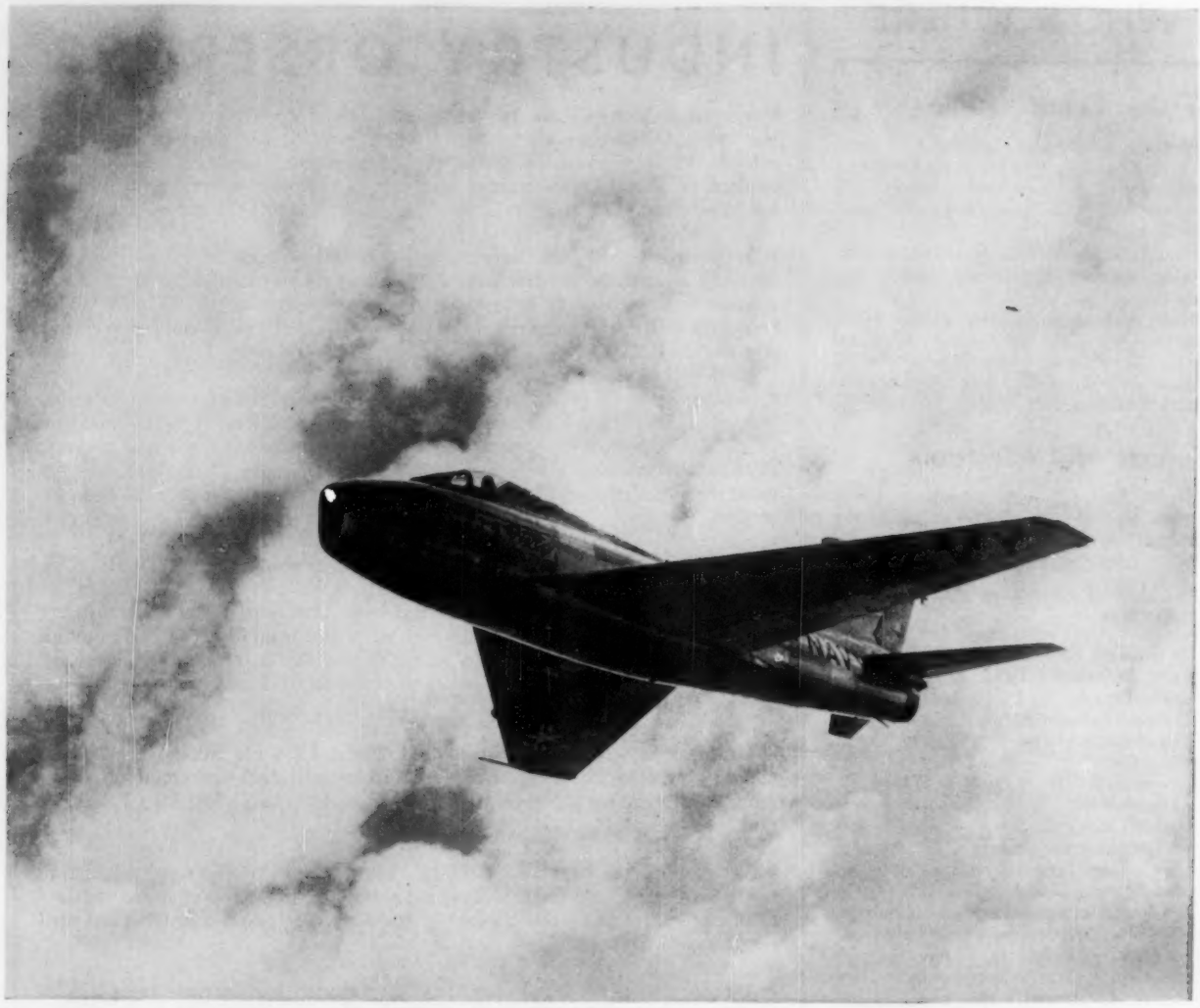
► **First Spanish-built helicopter has been successfully tested by the Spanish Air Ministry in Madrid. Aircraft was designed by French engineers and constructed under their supervision by the Empresa Aeronautica. It is powered by a 260 hp. gas turbine engine.**

► Dassault M.D. 550, lightweight delta-wing jet fighter, is near completion. Dassault claims the new single-seat fighter will outperform other aircraft in its class.

► **Goodyear Aircraft is developing the guidance equipment for an improved version of the Martin TM-61 missile. New version will have greater range and target accuracy. Test firing is being done at Holloman AFB, N. M.**

► Lockheed Aircraft Corp.'s F-104 has been returned from Palmdale, Calif., to Edwards AFB for further flight testing.

► **During evaluation tests of the C-band radar on a Convair 340 for United Air Lines, it was found that the radar nose improved the aerodynamic contour of the plane for an 8 mph. speed increase.**



TITANIUM speeds the Fury's flight...

North American's FJ-4, latest of the Fury series of Navy jets, flies with vital parts made of titanium—from nose to tail. For this fastest of the Furies has a heritage of titanium.

It was because of titanium's high strength-weight ratio . . . its corrosion resistance in sea air . . . its freedom from stress-corrosion cracking that titanium was specified for the FJ-2 and the FJ-3. It was the production experience and the performance of REM-CRU titanium alloy parts under the rugged conditions of supersonic flight that led to the further use of REM-CRU C-110M and C-130AM for primary fuselage frames and stiffeners, webs, angles and wing spar fitting on the FJ-4.

REM-CRU, pioneer in titanium alloys for aircraft applications, has expanded production facilities for sheet, strip, plate, bar, wire and tubing. This means your selection of size, shape and alloy grade can be delivered on schedule for your requirements. And REM-CRU engineers are always ready to assist with the application and fabrication of titanium.

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REM-CRU TITANIUM

REM-CRU TITANIUM, INC., MIDLAND, PENNSYLVANIA

Washington Roundup

Aircraft Investigations

Investigations of aircraft defense contractors now under way on Capitol Hill won't break into the public limelight for several months, some not until next year when the presidency will be at stake.

Senate Banking and Currency Committee, headed by Sen. William Fulbright, is drawing up its own list of companies with the largest volumes of defense business. Staff members say the Defense Department's list (AW May 30, p. 15) completely misses the point.

The committee is interested in the effect of defense business under the military build-up—which started in mid-1950—on the stock market and the economy in general.

Defense Department's report to the committee lists the volume of contracts let between mid-1953 and the end of 1954. It shows firms such as General Motors Corp. and Chrysler Corp. with "minus" volumes of defense business.

One staff member commented: "It took Defense Department 10 weeks to draw up their list for us. We decided to do the next one, with the background we want, ourselves." The prospect: On the committee's list, firms such as General Motors—which isn't even among the 100 firms with the most defense business in the department's list—will show up as the top companies on volume of defense contracts.

Robert Lanphier, Deputy Assistant Secretary of Defense for Logistics and Supply, said: "This report was made for the 18 months . . . at the specific request of the Senate committee. They asked for that particular period of time."

House Armed Services Investigating Subcommittee, headed by Rep. Edward Hebert, may open hearings by August. The subcommittee is investigating all conceivable aspects of six airframe contracts—four Air Force and two Navy.

House Appropriations Armed Services Subcommittee, headed by Rep. George Mahon, is just starting to assemble an investigation staff (AW May 23, p. 17). "We are not out to find individual cases of graft—although I expect there is some of that," Mahon told AVIATION WEEK. "We want a very thorough investigation to find out why contractors are getting so fat on defense business. This will take a long time and many field investigations at the staff level."

The prospect: The subcommittee may save ammunition it collects to fire at defense officials when they appear before it early next year on the budget for Fiscal 1957.

Senate Preparedness Subcommittee, appointed over two months ago with Majority Leader Sen. Lyndon Johnson as chairman, hasn't held an organizational meeting or selected a counsel and staff.

Field Representative Controls

Aircraft Industries Assn. is seriously disturbed by Air Force efforts to tighten controls over field service representatives. USAF, which has the major share of about 2,500 company representatives at military installations, wants to put them under separate contract, divorced from the production arrangement with their employers.

Object: To keep better record of the representatives and what they do, make it possible to cut down on their numbers, charge their cost to proper USAF activity and provide the answer when congressmen ask how much is spent for this purpose. In addition, USAF charges field representatives sometimes embarrass commanders, abuse their privileges, ignore military authority or are unfamiliar with operating problems. Industry, on the other hand, frequently feels the representative should be present when USAF sees no need for him. This is to provide better service for customer, provide prompt communication with plant when fixes or design change ideas are brought to light.

CAB to Speed Cases

Civil Aeronautics Board Chairman Ross Rizley has set this schedule for processing major cases:

New York-Chicago Case with 21 participants. Oral argument will start in August or September.

Denver Case, with 9 participants. The Board's decision will be issued in the fall, after oral arguments during September.

Irregular Case, with 212 participants. The Board hopes to dispose of this before the first of the year.

Prototype Testing

Legislation extending Civil Aeronautics Administration's $12.5 million authorization to test prototypes of new transport types seems to have little practical significance. The authorization has been on the books for five years. But after several failures, CAA stopped attempting to obtain funds from Congress to implement the program.

CAA and the industry, though, would like to keep the authorization on the books—in case the climate might change.

The legislation proposed by Sen. Warren Magnuson would extend it another five years, from the expiration date Sept. 30.

ODM's Dispersal View

Defense Mobilization Director Arthur Flemming attempted to put industrial dispersal, always a hot political issue, in perspective at a Congressional hearing. He observed: "We regard this as an age of peril. The President has defined that to be 40 to 50 years and we think this industrial dispersal objective is one that should be set within that framework, and not regarded as an objective to be achieved overnight. In fact, it cannot be achieved overnight. . . .

"I feel that we have reached the place where we have to do this on a case-by-case basis and that we cannot apply nationwide standards . . . dispersal is a laudable objective but we cannot let it become an end in itself, because another objective we must always keep in mind is a properly functioning urban economy. If we went wild on dispersal we could destroy our urban economy, and instead of strengthening our security position weaken it."

Meanwhile, ODM is working on four readiness plans to meet situations that might develop: Involvement in local hostilities; general mobilization not involving an attack on the U. S.; general mobilization with an attack on the U. S.; and prompt mobilization, at the push of a button, necessitated by an attack on the U. S.

—Washington staff

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USAF Recognizes Red Gains, Spurs B-52

Boeing bomber production schedule is accelerated, reversing Administration position on Soviet air power.

By Claude Witze

Washington, D. C.—U. S. Air Force has accelerated production of the Boeing B-52 bomber, reversing the Defense Department's policy of discounting the threat of growing Russian air power. At the Pentagon last week, similar action was being considered for fighter aircraft in the "Century Series" now in production. These include the North American F-100, McDonnell F-101, Convair F-102 and Lockheed F-104.

Decision to speed production output of USAF's largest and fastest jet bomber followed congressional pressure led by Sen. Stuart Symington, a former Air Force Secretary, and disclosure in AVIATION WEEK (May 23, p. 12) of the facts about recent Soviet displays of new planes over Moscow.

Scheduled rate of increase in production of the B-52 is 35%. Expected cost is $300,000,000.

News of the increased production rate of the Boeing bomber came only 48 hours after a press conference in which Defense Secretary Charles E. Wilson confirmed figures on the recent Moscow air display as published in AVIATION WEEK but maintained that the U. S. continues to hold superiority, and said he did not expect to ask Congress for more USAF appropriations.

President's Views

Obvious Pentagon hope was that a full-scale investigation of U. S. readiness for atomic war and how top Defense Department civilians evaluate and use intelligence information would be avoided.

The evidence last week was that the Administration was caught flat-footed by the progress made in Russia but was attempting to avert any immediate investigation by ordering big jet bombers built faster than the original schedule.

While Sen. Symington and other Democrats favored an investigation, a positive decision has not been arrived at.

Sen. Leverett Saltonstall and other Republicans discounted the need for action, insisting that the U. S. holds at least qualitative superiority and has a big advantage in the location of its foreign bases. Sen. Saltonstall refused to comment on the decision to speed B-52 production.

President Eisenhower last week said Moscow had exhibited more modern jet bombers than the U. S. had anticipated. But, he insisted, the American B-36 is still a good plane. He made no mention of the disclosure that the Russians now are known to have thousands of the new MiG-17, an aircraft comparable to the North American F-100 and an efficient weapon against bombers of the B-36 type.

It was USAF Secretary Harold E. Talbott who announced that production of the Boeing B-52 Stratofortress will be accelerated 35%, cutting one year off the timetable for completion of scheduled deliveries. The decision was announced almost immediately after Talbott and Gen. Nathan F. Twining, Air Force Chief of Staff, were questioned in executive session by the Senate Armed Services Committee.

Wilson's Views

Only two days before, Defense Secretary Charles E. Wilson, buttressed at his press conference by Roger Lewis, USAF Assistant Secretary for Materiel, showed no signs of being disturbed by the reports of Russian airpower gains. They insisted the U. S. is retaining its qualitative and quantitative air superiority.

Wilson and Lewis indicated that there is no cause for concern because the B-52 is being built at both Seattle and Wichita plants of the Boeing Airplane Co., and production could be increased at any time.

Said Wilson: "We can step up our production on specific items at any time it is determined necessary to meet any threat to our security."

He did not describe the Moscow air display as a threat and indicated there would be no alteration of production schedules.

Congressional Reaction

Reaction of Senate critics to the about-face 48 hours later was expressed by Democratic Sen. Henry Jackson, who commended the Air Force for its action, but added:

"I only wish the Secretary of Defense had been more frank and factual in his attempts to inform the American people on the subject of air power.

"The information on which the Air Force decision is based was available to Mr. Wilson at the time of his press conference, inasmuch as it had already been made available to our Atomic Energy Subcommittee through the testimony of our top military leaders."

Sen. Jackson continued:

"The unpleasant truth is that for the next few years the ability of the U. S. to stay ahead in the armaments race will depend on the extent to which we push development of our delivery systems. These involve not only long range jet bombers but jet fighter craft as well, together with our whole family of guided missiles including the most important of all—the intercontinental ballistic missile.

"The race for this last weapon is the most vital since the race for the hydrogen bomb and only a crash effort in this field by our government can avert disaster.

"In the past we have had a large lead in industrial technology over the Soviets. We can no longer talk complacently about our superior technical and industrial know-how. Today we find that when the Russians are willing to dedicate a sufficient part of their

Effect on Boeing

Boeing spokesmen told Aviation Week they do not expect increased production of the B-52 will cause any appreciable increase in employment rolls.

They point out that the learning curve at the Seattle plant is declining. It was expected that there would be some reduction in employment, covered by normal attrition. Under the new program the figure will remain stable. At Wichita, where the B-52 line is set up, but no aircraft have been completed, the same holds true because the company is gradually phasing out the B-47 jet bomber.

Additional facilities needed at the two Boeing plants will be minor, the company said, mostly in the area of machine tools.

The wide subcontract base already established for the B-52 project, involving several major aircraft and component manufacturers, is expected to expedite the program. Boeing said some additional sources may be needed.

industrial potential to a given armament field, they must be treated as equals.

"We simply can't afford to take second place in any of the races to develop the most effective delivery system for nuclear weapons," Sen. Jackson said.

Senator 'Not Satisfied'

Democratic Sen. Warren G. Magnuson, citing cuts in research and development funds as the weapons race gets hotter, said "there would be more comfort in knowing that we have on the drawing boards and ready for production newer, faster and better models."

Magnuson, a member of the Senate Appropriations Committee, charged "the civilian leaders in the defense establishment and the Administration have not recognized and still do not recognize the basic cause of our weakness."

"There would be more comfort in an announcement from the Administration of an accelerated program for research and development and for training scientists and engineers, who are indispensable to it."

Another member of the Senate Armed Services Committee, Democratic Sen. Sam Ervin, said he was not satisfied with the announced 35% increase in production rate for the B-52.

"I think it should be stepped up more," he said. "We must realize we're living in dangerous times and act accordingly."

Democratic Rep. Clair Engle told the House that General Twining himself did not underestimate the Russian threat and pointed out that the USAF chief had bluntly said Soviet long range jet heavy bomber "gives us real reason for concern."

Engle congratulated Twining for understanding the implications of Russian progress, saying they "have upset the timetable again and have achieved air strength faster than we expected them to. With defensive strength achieved, they are now building an offensive long range bomber force to deliver the nuclear weapons that they also achieved ahead of the schedule we had set for them."

Effect of Decision

Anticipated effect on the accelerated B-52 production schedule had several facets:

• **Unofficial estimate** was that USAF would ask Congress at once for $300 million in additional funds to meet added costs of the program. This was for the bomber alone, did not include money for possible increase of planes.

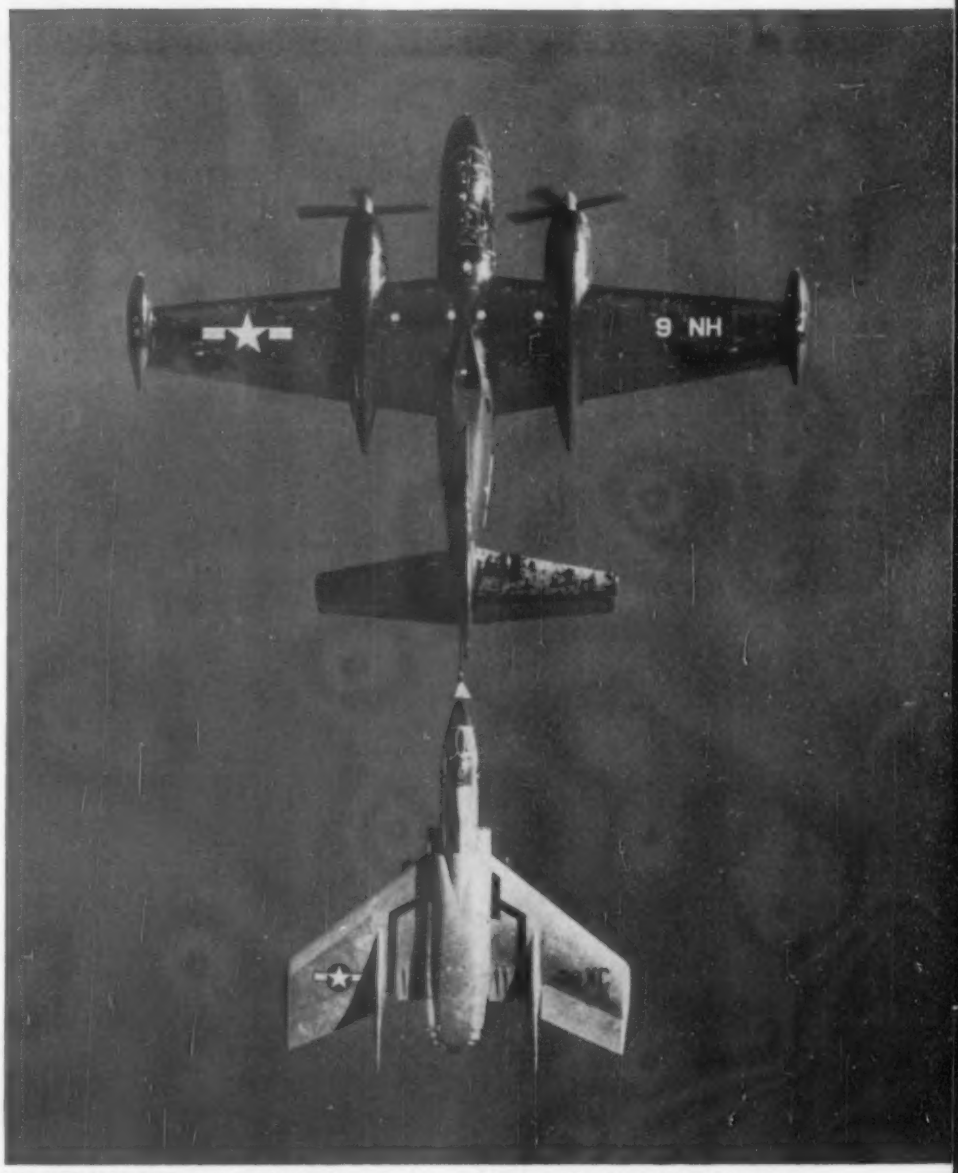
• **There were reports** that a total of 500 B-52's is involved in the Boeing order, indicating that the size of USAF heavy bomber wings will be increased as the Convair B-36 is replaced by the new heavy jets. At present a heavy bomber wing has 30 aircraft. This probably will be increased to 45. USAF has 11 heavy bomber wings.

• **USAF,** already hurt by a reduction in recruiting funds, faces vast new personnel problems to absorb aircraft faster than the original schedule. Transition training for air and ground crews and operations facilities programs will be strained by the change. It is anticipated that the Fiscal 1957 USAF budget request will reflect the need for money to meet these contingencies.

• **While serious thought** is being given to the necessity for improved continental defense, there was no indication that anyone outside of USAF is devoting attention to the subject. Secretary Wilson said the U.S. will depend on superior technology rather than matching the Russians in number of planes. A week later, President Eisenhower said he did not know that the Air Force will ask for more money for continental defense, but he hoped that the Russian long range bomber news will spur Americans to do more for the civil defense program.

• **Pratt & Whitney Division,** United Aircraft Corp., was prepared to step up deliveries of the J57 engine. Eight of the 10,000-lb. thrust turbojets are used to power the B-52.

• **Navy's Bureau of Aeronautics** said that no increase in the production rate of carrier aircraft is contemplated.



CHANCE VOUGHT F7U-3 CUTLASS noses into a drogue trailed by a North American AJ-2 tanker during a Navy demonstration of its aerial refueling concept for carrier-based turbojet aircraft (AW Mar. 14, p. 88). Both are from Air Development Squadron 3.

CAB Speeds Local Certifications

By Preble Staver

Washington, D.C.—Civil Aeronautics Board last week outlined simple procedures to carry out legislation granting permanent certificates to local service airlines.

The Board and the 14 eligible carriers have been in agreement that the process of issuing certificates should be handled in the quickest, easiest and least expensive way.

CAB Chairman Ross Rizley told the carriers that the Board and its staff "stands ready to implement the new law as soon as possible after their filing applications in accordance with the new act."

Priorities Arranged

Each permanent certificate proceeding involves three steps:

- **The local service** air carrier must file an application.
- **The Board** will issue a show cause order.
- **Public hearings** will be held in Washington.

To further expedite the proceedings the issues have been restricted, priority over other local service cases assured, and a schedule for appearances established.

The Board's certification policy statement said: "These proceedings will be limited to the issues inherent in the grant of permanent certificates to the carriers and the determination of those intermediate points to be certificated on a temporary basis.

"The permanent certificate proceedings will be scheduled for processing in the order in which the carriers' existing temporary certificates expire (see box). They will be given priority over other local service cases . . .

"Because of the restriction of the issues to those largely non-controversial in nature, and in order to assure the most efficient use of available staff essential to the most rapid processing of these cases, public hearings . . . will be held in Washington."

Problem Before Board

Major problem confronting CAB was determining which intermediate points on a carrier's route will warrant permanent certification and which ones will be only temporarily certificated. The Board's solution is to rely on an industry-wide traffic standard, which should assure equitable treatment among the cities involved.

CAB said it found, after an analysis of the latest available data, "that an average of five or more passengers enplaned per day (approximately 300 per month on and off per station) should provide a reasonable basis for initial selection of the group of intermediate stations for permanent certification. In the absence of further evidence, those stations enplaning fewer than five per day would receive temporary designation."

The board further states it is "not to restrict the right of any party to submit relevant evidentiary material, the Board believes that the record in the proceedings covering those points identified for permanent certification could be limited, largely, if not entirely, to stipulated data. Additional evidence, therefore might be necessary only as to those points tentatively identified for temporary certification."

No Service Loss

In this respect, the Board also stressed that no station which is eligible for either permanent or temporary certification will lose service as a result of the proceedings. The door was left open for any city listed in a show-cause order as qualifying only for temporary certification to submit evidence in support of a permanent authorization.

At the present time, the local service industry has been authorized to serve 313 intermediate points. The carriers are actually serving 267 of these intermediate points. Based on traffic data reported in 1954, there were approximately 174 local service intermediate points for which five or more passengers enplaned per day and 93 points with less than five.

CAB Guides

Other problems, not covered by the policy statement, but anticipated by the Board's staff include:

- **How to treat** cities now being served under an exemption authorization.
- **What to do** about cities authorized for service but not being served.
- **What to do** about cities where trunkline service has been suspended in favor of local airline service.

The Board's guide is the new certification law which provides:

- **A carrier must have** been furnishing local service under a temporary certificate from Jan. 1, 1953, to the date of its application which must be filed in the period from May 19 to Sept. 16, 1955.
- **Eligible terminal** and intermediate points are those between which the carrier continuously operated between May 19, 1955 and the date of the carrier's application.
- **CAB may limit** the duration of the certificate to no less than one-half of the intermediate points.

Proceeding Priority

Here is the order of priority Civil Aeronautics Board will follow in handling local service airlines' applications for permanent certification. The certificate proceedings are to be scheduled for processing in the order in which the carriers' existing temporary certificates expire.

Carrier	Expiration Date
Trans-Texas Airways	3/31/54
Southwest Airways	9/30/54
Continental Air Lines (Pioneer Air Lines)	9/30/54
West Coast Airlines	9/30/54
Frontier Airlines	3/31/55
North Central Airlines	9/30/55
Lake Central Airlines	12/31/55
Central Airlines	2/20/56
Allegheny Airlines	12/31/56
Southern Airways	12/31/56
Bonanza Air Lines	12/31/57
Piedmont Aviation	12/31/57
Mohawk Airlines	6/31/58
Ozark Airlines	9/30/58

The Board expressly emphasized that its plans for procedures were designed to expedite to the greatest extent possible the processing of permanent certificates for the local airlines.

CAB noted that consideration of proposed route extensions and modifications of local service route necessarily will be delayed in order to give priority to the permanent certificate applications. However, the Board indicated it will consider such proposals as soon as possible in appropriate individual or consolidated proceedings.

First two carriers expected to be permanently certificated by the Board are Southwest Airways and Trans-Texas Airways. CAB said it isn't contemplated that show-cause orders will be necessary for either of these carriers, since there are formal proceedings now near completion concerned with the temporary or permanent renewal of their routes. The program is to issue decisions in the two cases concurrently.

Five Carriers File

The other 12 air carriers being granted permanent certificates are Allegheny Airlines, Bonanza Air Lines, Central Airlines, Frontier Airlines, Lake Central Airlines, Mohawk Airlines, North Central Airlines, Ozark Airlines, Piedmont Aviation, Southern Airways, West Coast Airlines, and Continental Air Lines, a trunkline air carrier which recently acquired Pioneer Air Lines, the original local service carrier. Five of these carriers—Central, Lake Central, Bonanza, Trans-Texas, and Frontier—had filed their applications with the Board by June 1.

Military R & D Lagging, Hoover Charges

Speaking out at the peak of a national debate over the extent of Soviet technological advances, particularly in air power, the Hoover Commission last week charged that U.S. military services lack daring and imagination in their approach to radically new weapons.

The commission sent to Congress 15 recommendations of its Task Force Subcommittee on Research and Development in the Department of Defense and said:

- **Adoption** of the recommendations and five years of hard work could improve our R & D effectiveness 25%.
- **Improvement** by 25% may not be enough "to maintain our leadership in weaponry."
- **Additional** funds are necessary for the Defense Department to pursue R & D "opportunities and demands."

The commission emphasized that all but two of the 15 Task Force recommendations can be carried out simply by proper administrative action in the Defense Department.

Praise for Air Force

It was clear from the study that the R & D activity and administration in the Air Force was better than that of the Army, Navy or Defense Department itself. The Task Force commended USAF on these points:

- **Establishment** of an Assistant Secretary for Research and Development with an appointee (Trevor Gardner) who meets the professional requirements for the job.
- **Development** of the weapon system concept to insure proper integration of components.
- **Creation** of the Air Research and Development Command. The group recommended a new adequate permanent headquarters to replace outgrown facilities in Baltimore.
- **Increased** reliance on private industry to carry out weapon system programs from conception to production, even when part of the work must be done at USAF installations.

The Army and Navy, on the other hand, were found to have organizations "not well suited to the needs of modern weaponry development." The reason: Both branches develop new ideas in "compartments," each with seven independent corps or bureaus that have a voice in weapons programs.

Both services, the Task Force said, are aware of the deficiencies and have taken steps to improve the situation. Cited were the Army's centralization of control over all R & D projects under the Deputy Chief of Staff for Plans and Research (AW Jan. 10, p. 14) and a program that will give the Office of Naval Research staff co-ordination responsibilities, a move the commission calls a "limited step" in the right direction.

Military Rotation

In passing on the 15 recommendations of its Task Force, the commission urged adoption of the 13 that can be put in effect by administrative order. It then added its own recommendations concerning rotation of military personnel and the stature of civilian employes:

- **That military R & D officers** serve longer periods to become professionally adept.
- **That these officers** get the same preferment and promotion they would have in shorter-term military assignments.
- **That the civil service employe** quality in R & D be strengthened.
- **That the assistant secretaries** for R & D in the Defense Department and the three services, appointed by the President, be chosen for their competency in the field.

The commission report declared that the U.S. has organized the "largest integrated scientific and technical endeavor that any nation has ever attempted" and that "our strategy and tactics can be superior to those of potential aggressors only to the extent that research and development provide superior design of weapons."

It pointed out that military R & D budget proposals for Fiscal 1956, including improved facilities and the use of personnel budgeted to other agencies, totals more than $2 billion. In 1940 the sum was $29 million.

At the top level in the Defense Department, the Task Force is critical of the separation of functions into R & D and Applications Engineering with an assistant secretary for each job. It called this "unsound organization" and said one assistant secretary should administer both areas.

Criticizes Duplication

The group further is critical of waste and duplication in the R & D programs of the three branches of the armed forces. Blame here bluntly was placed on the "self-sufficiency complex" of the Army, Navy and Air Force.

While the report recognized the need for duplication in some areas, it advised the Defense Department to use its check on the purse strings to halt projects that are not warranted.

Most of the new weapons contributions made in World War II, the report pointed out, were from the Research and Development Board. Since then, it said, radically new approaches "have been largely inspired through informal proddings by civilian scientists and technologists" while the armed services "have not distinguished themselves."

Defense Department was urged to set up a top flight committee to "canvass the needs and opportunities presented by new scientific knowledge for radically new weapons systems."

On the evaluation of weapons systems, the report called for expansion of

Favors Civil Contracts

The Hoover Commission Task Force agrees with the Aircraft Industries Assn. that research and development and design operations for new weapons usually can be done best by civilian agencies.

The group found that in 1954 industry got 50% of the appropriated funds ($700 million), academic and non-profit institutions got 10% ($140 million) and the balance ($560 million) was spent at military installations. Of the latter figure, the report says, $125 million was for "work that was susceptible to shift into the civilian economy."

Questions Adequacy

New ammunition for military, scientific and political critics of the Defense Department, who fear that U. S. technological superiority has not kept ahead of Russian advances, can be found in the Hoover Commission Report on Research and Development.

Says the Commission's Task Force: "Serious consideration needs to be given to the adequacy of the present research and development level. Pioneering in intercontinental ballistic missiles, the maturing technology of shorter range missiles, the needs for greater effectiveness in continental defense, the opportunities for major improvements in all military electronics through application of the rapidly evolving solid state electronics technology, for example, combine in presenting the Department of Defense with an increasing volume of research and development opportunities and demands. It would be false and dangerous economy to hold the research and development appropriations at a level too low to permit a volume of effort essential to effective programs in areas of opportunity for new and improved weaponry."

the Weapons System Evaluation Group, shifted to a contract operation, probably with a university. Expansion of this activity is needed, according to the study, because it is of so much importance to the Joint Chiefs of Staff.

Personnel Requirements

Other highlights from the report:

• **The armed forces** are more fussy about the organizational structure and personnel of high professional capacity in finance, logistics and personnel than they are in R & D, where such a policy would bring the greater reward.

• **Present activity** in basic and applied research by the armed forces is inadequate. In 1954 this type of work accounted for only $20 million of expenditures for knowledge "basic to our progress in new weapons systems."

• **Expansion** since the war of R & D facilities and personnel for operations by the armed forces has been "at a lower level of effectiveness" than could be obtained from civilian agencies—industry, universities and non-profit institutions.

• **Military personnel** at the officer level in R & D activity won praise, but the commission said not enough young officers are being trained for the complex jobs ahead. Even with a shift of a portion of the work to outside agencies, about 30% of the appropriated R & D funds must be spent within the Defense Department and competent men are needed to supervise these projects.

• **High praise** was given to both the National Advisory Committee for Aeronautics and the Atomic Energy Commission for their competence and contributions to defense. The Tennessee Valley Authority received credit for work in relation to certain gases.

Members of the Task Force reporting on the Defense Department R & D effort were Mervin J. Kelly, president of Bell Telephone Laboratories, chairman; Frederick L. Hovde, an advisor to the National Research Council; Robert M. Kimball, Massachusetts Institute of Technology and former associate director at Los Alamos; C. Guy Suits, director of research at General Electric Co., and Clyde E. Williams, president of Battelle Institute and AEC advisor.

Former President Herbert Hoover, chairman of the Commission on Organization of the Executive Branch of the Government, transmitted the report.

Group Asks 15 Research Changes

Here are the recommendations of the Hoover Commission Task Force Subcommittee on Research and Development in the Department of Defense:

No. 1. That the Department of Defense review and assess the effectiveness of the recently established plan of combined operation of the offices of the Assistant Secretary (R & D) and the Assistant Secretary (Applications Engineering) with a view to their integration into the office of one assistant secretary.

No. 2. That the authority of the Secretary of Defense to withhold appropriated funds from any research and development project be wisely and fearlessly used to promote integration of the programs of the three departments, to prevent unwarranted duplication, and to promote effectiveness and efficiency in the use of research and development funds.

No. 3. That the office of the Assistant Secretary (Research and Development) give emphasis in its consideration of research and development programs in preventing unwarranted duplication, and that the Assistant Secretary (R & D) and Assistant Secretary (Applications Engineering), through standardization for production procedures, prevent duplication in weapons.

No. 4. That Assistant Secretary of Defense (R & D) appoint a standing committee, reporting directly to him, of outstanding basic and applied scientists. This committee will canvass periodically the needs and opportunities presented by new scientific knowledge for radically new weapons systems. The Assistant Secretary of Defense (R & D) will appropriately implement this committee's recommendations where action is indicated.

No. 5. That the Weapons Systems Evaluation Group be shifted to contract operation with university or nonprofit organizations. It then be expanded to a size adequate for performing the studies required by the Joint Chiefs of Staff and Assistant Secretary of Defense (R & D).

The Assistant Secretary of Defense (R & D) be responsible for the action essential to bringing Weapons Systems Evaluation Group to an adequate level of size and effectiveness.

No. 6. That an administrative review and assessment of the operations and contributions of all committees and consultants be made by the Department of Defense and each of the military departments.

No. 7. That an Office of Assistant Secretary for Research and Development be established in each of the three military departments. This office be restricted in its functions to the research and development organization and operations of the department.

That the Assistant Secretary be trained in science and technology and experienced in the operations and administration of research and development.

That this office have a small staff trained in science and technology and experienced in the operation and administration of research and development.

No. 8. That the level of basic research in the Department of Defense be significantly increased above its present $20 million level of annual expenditure.

No. 9. That where choice is possible, operations of research and development should be performed at that place in the nation where they can be done most effectively and with the greatest efficiency.

No. 10. That the Secretary of the Army and his Chief of Staff give strong support to the research and development staff reorganization of Dec. 23, 1954. The staff be adequate in size and of highest possible professional competence in research and development. The staff be given positive and effective administrative support in its operations in meeting its responsibility for control, integration, and coordination of the Army's R & D programs.

No. 11. That the Secretary of the Navy and responsible senior Navy officers give strong administrative support to the new functions of the Office of Naval Research in coordinating and integrating the development program of the Navy. A staff adequate in size and of highest research and development competence be provided, and programmatic recommendations of Office of Naval Research be implemented.

No. 12. That each of the military departments make a realistic examination of their growing needs for technical officers. If need be, as the task force subcommittee expects, expand their programs to provide generously for an expanding number of officers trained in research and development.

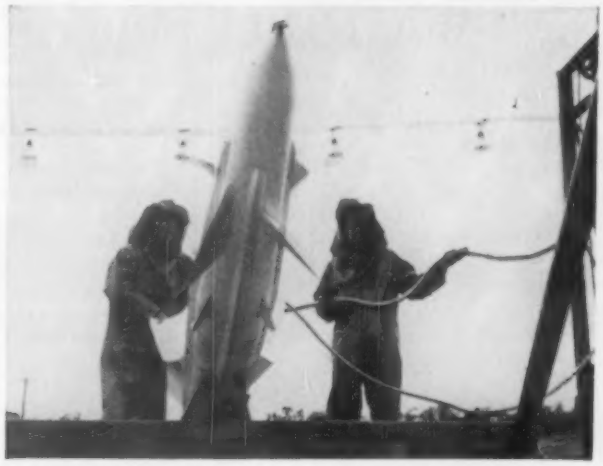
No. 13. That the three military departments review policies and their implementation on career officers in research and development. Move toward limiting the areas of rotation of research and development officers to technical assignments, and increase the time period of assignment in a position.

No. 14. That higher levels of compensation for civil service professional employes be established, more nearly competitive with industry, and the number of higher level civil service positions be materially increased.

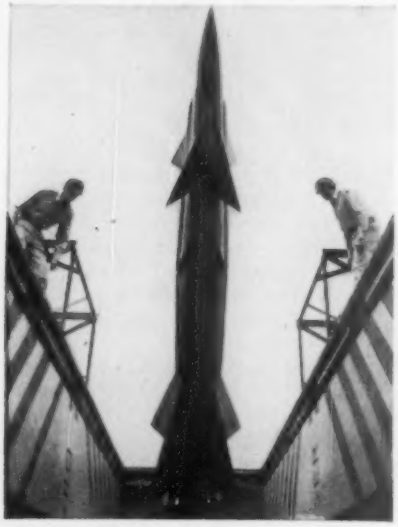
No. 15. That the Department of Defense make a close examination of the operations under "cognizance" and take appropriate action to insure the preservation of the present highly effective integration of the development program through the Military Liaison Committee and the Armed Forces Special Weapons Project Organization.

Firing Nike Guided Missile from Anti-Aircraft Launching Sites

PRE-FLIGHT SERVICE includes filling hydraulic system, then . . .

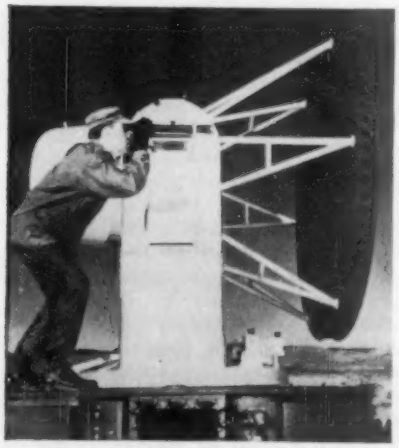


FUELING MISSILE before it is moved into the magazine.

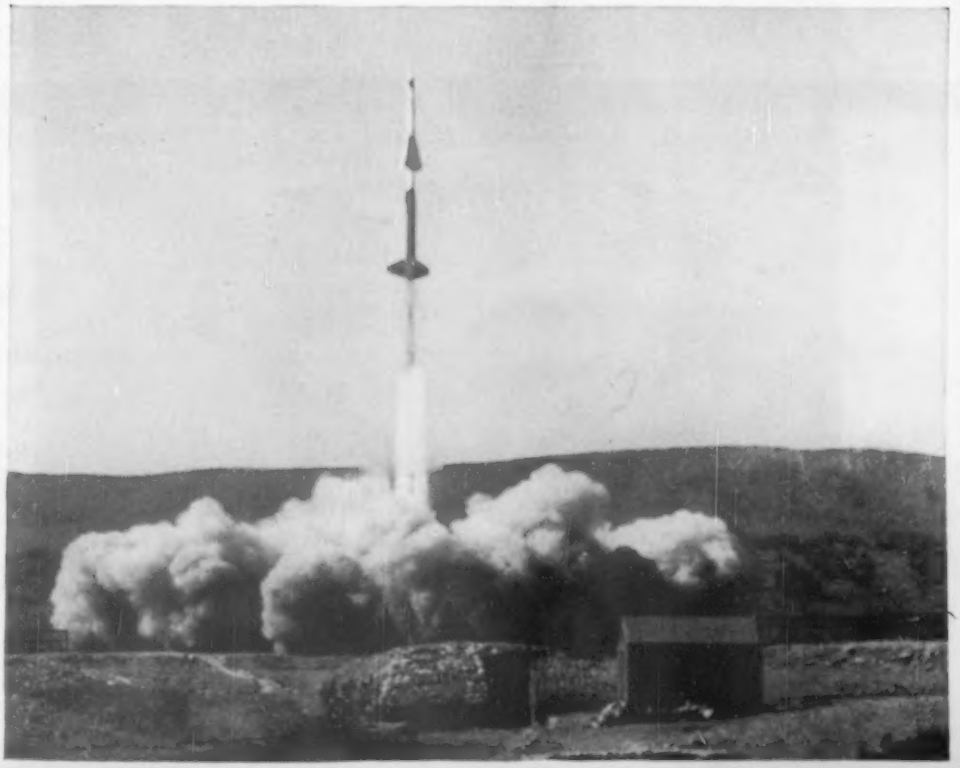


ARMY'S NIKE is raised from the magazine storage vault to launcher rails by elevator.

ON FIRING LINE, Nike battery raises into position at Lorton, Va., site near Washington.



RADAR SCANNER (above) checks instrument, and Nike missile is blasted into the air by booster during practice firing in practical field training of anti-aircraft battalion crews at Red Canyon Camp, N. M.



Range of 6,500 Miles Claimed For TWA 1649A Super Connies

Los Angeles—Lockheed Aircraft's Model 1649A Super Constellation will have the greatest range of any airliner ever built, according to a company report.

Maximum top speed will exceed 400 mph., with maximum cruise about 350 mph. But as a result of elimination of customary refueling stops, the plane's point-to-point speed at ranges beyond 4,200 mi. will be up to 70 mph. faster than any other piston-powered plane, it is claimed.

Scheduled to start service in 1957 on Trans World Airlines, 24 of the 6,500-mi.-range planes will be produced for Howard Hughes (AW Apr. 25, p. 117) for assignment to TWA. Total cost, including spares, will be about $70 million. The 1649A is expected to help establish a new pattern of air routes and make possible nonstop service between widely separated world airports.

Key to the plane's performance will be a completely new wing and the improved Model R3350-EA-2 Wright Turbo Compound engine with 3,400 hp., instead of the present 3250-hp. DA-3 engines in the 1049G Super Connies.

The wing, largest of any airliner in service, will span 150 ft.—27 ft. more than on present Super Connies. Total area will be 1,850 sq. ft., an increase of about 200 sq. ft. But wing will be one-sixth thinner. Design of the wing allows for turboprop installations as future possibilities.

Flying quietness also is stressed. Engines are five feet farther out on the wing to reduce sound and vibration. Additional improvement is expected from the larger props turning at slower speed. The three-bladed prop will measure 16 ft. 10 in. against 15 ft. 2 in. now.

The new transport, carrying 58-64 passengers in luxury style, will be convertible to higher-density tourist seating.

Fuel capacity of the 1649A will be 9,600 gal., in comparison with 6,500 gal. on most Super Connies and 7,750 gal. on tiptank-carrying models.

Maximum takeoff weight will be 156,000 lb., up from 137,500 lb. on current Super Connies. Maximum landing weight will be 123,000 lb., up from 113,000 lb.

Space-limit payload will be 17,000 lb., even up to 4,700-mi. ranges. More than 16,000 lb. payload will be carried for more than 5,000 mi.

Fuel lines will be placed inside tanks. Hydraulic systems will be 3000 psi., with completely independent dual pressure source and each system operated by different parts of engines.

Extensive use of integral stiffening will be made in the structure.

Air France Orders 1649As

Los Angeles—Air France ordered 12 Lockheed 1649A Super Constellations last week for delivery in late spring of 1957. The order, worth $32 million, is the second Lockheed has received for this transport.

"In keeping with Air France policy to maintain the most advanced fleet of aircraft, the company has purchased the Lockheed 1649A Super Constellation," said Henri J. Lesieur, general manager for Air France's North and Central America and Caribbean Divisions. "It will be the only available commercial aircraft capable of schedule nonstop trans-Atlantic service both westbound and eastbound."

New Look of the Shangri-La

USS Shangri-La (CVA-38) is the Navy's first attack carrier to embody all of the latest improvements being made in the Essex-class. Modernization includes: angled deck, steam catapults, high-capacity arresting gear, enclosed bow, increased fuel capacity and tractor ramp around outside of the island to speed aircraft spotting on carrier's flight deck.

U. S., Britain Agree On Transpolar Routes

An agreement for exchange of transpolar routes between Los Angeles, San Francisco and London has been reached in negotiations between the American and British governments in Washington.

In a week of discussions, the group decided on reciprocal rights for American and British carriers on the polar route between the West Coast and England. The negotiators also agreed on reciprocal authorizations for the New York-Nassau route now operated by British Overseas Airways Corp.

Discussions were broken off when the British group, headed by Sir George Cribbett, Deputy Secretary of the Ministry of Transport and Civil Aviation, left for the International Civil Aviation Organization meeting.

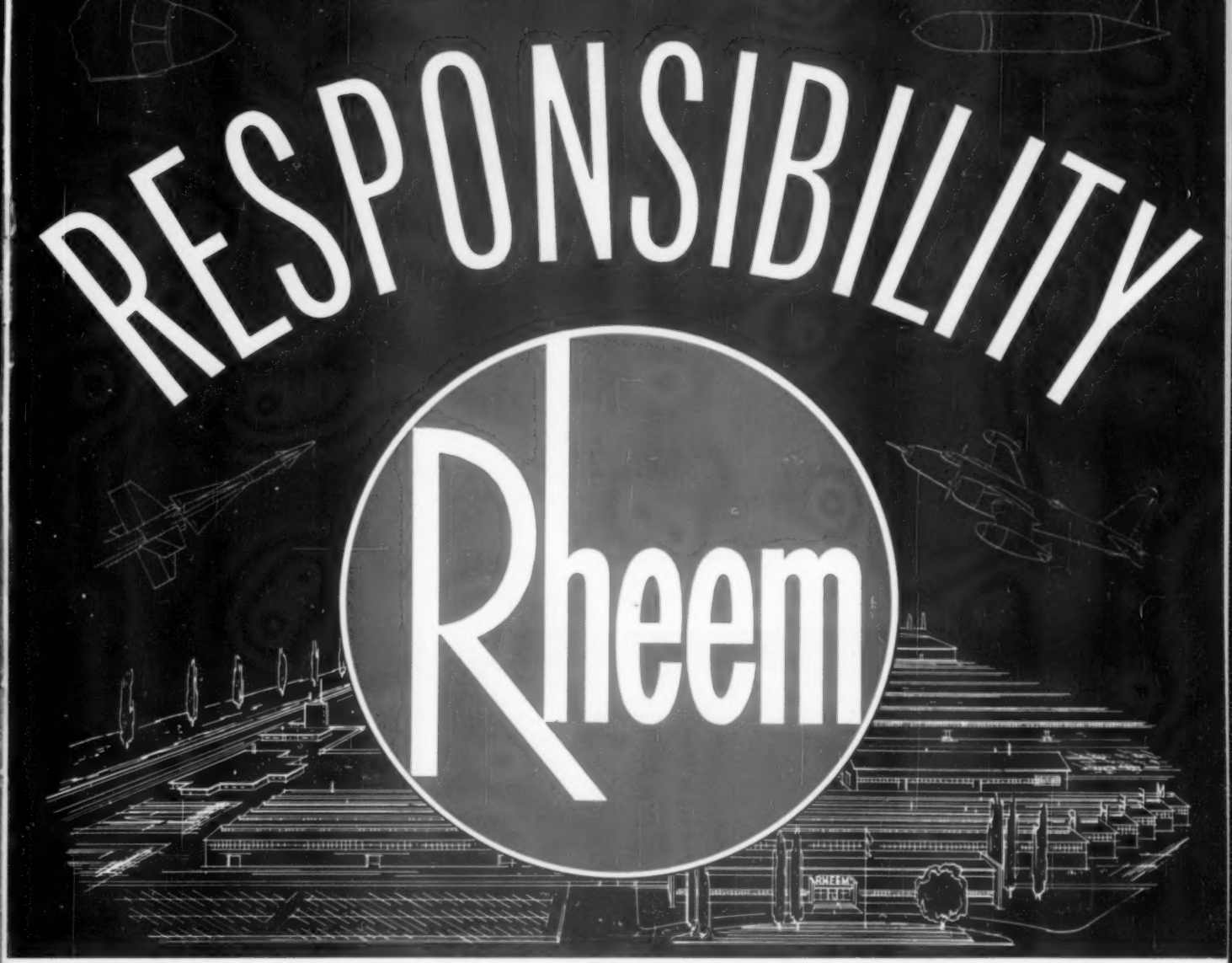
The U. S. delegation was headed by J. Paul Barringer, director of the state department's Office of Transport and Communications, and Chan Gurney, a member of the Civil Aeronautics Board.

The Washington discussions have left unresolved a number of controversial route questions. A chief British aim is to complete round-the-world service by flying over the United States using New York, Chicago and a West Coast point on a London-Sydney route.

Routes sought by American carriers include traffic rights between London and Rome and cities to the east to implement a route recently granted Trans World Airlines by the CAB. The new authorization connected Frankfurt and Zurich, thus connecting London and Frankfurt with TWA's main line to the south and east.

Another right sought by an American carrier is entry of Northwest Airlines into Hong Kong. This route was granted to Northwest by the CAB in the trans-Pacific route case, but it also needs an authorization from Britain.

RESPONSIBILITY



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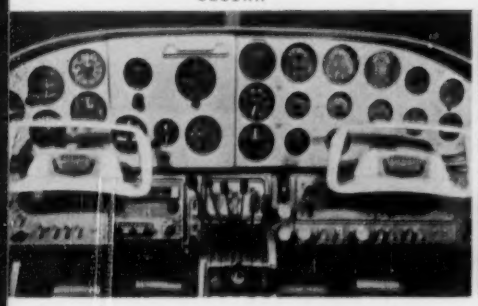
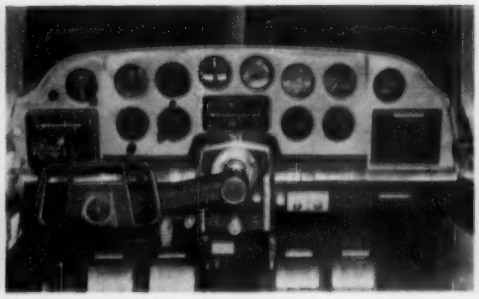
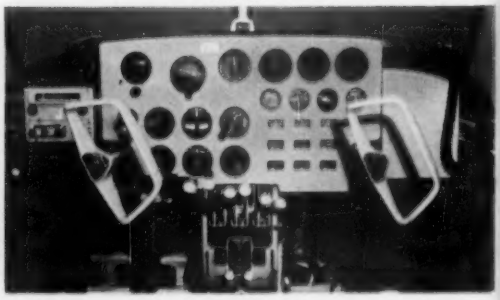


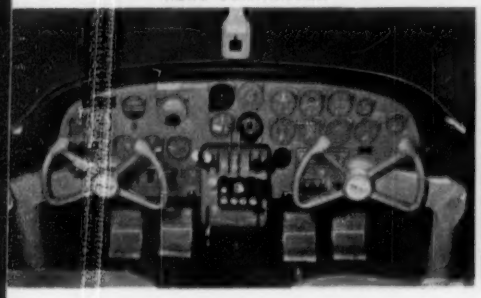
BEECH



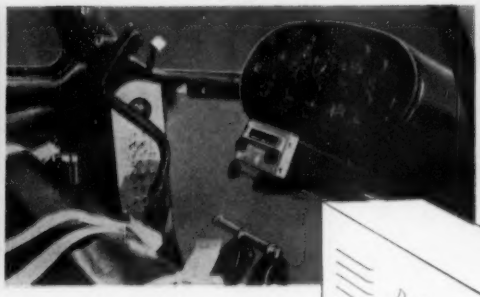
PIPER



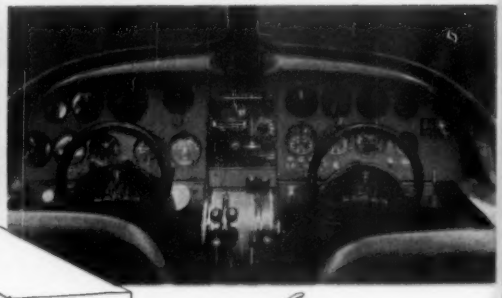
AERO COMMANDER



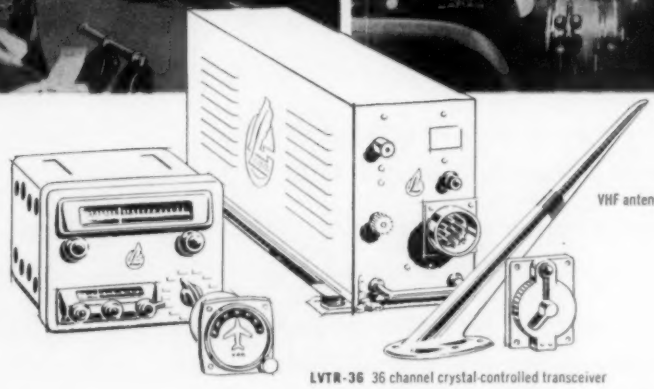
BELL



CAMAIR



LTRA-6 VHF transceiver, OmniMeter, LF receiver



VHF antenna

LVTR-36 36 channel crystal-controlled transceiver

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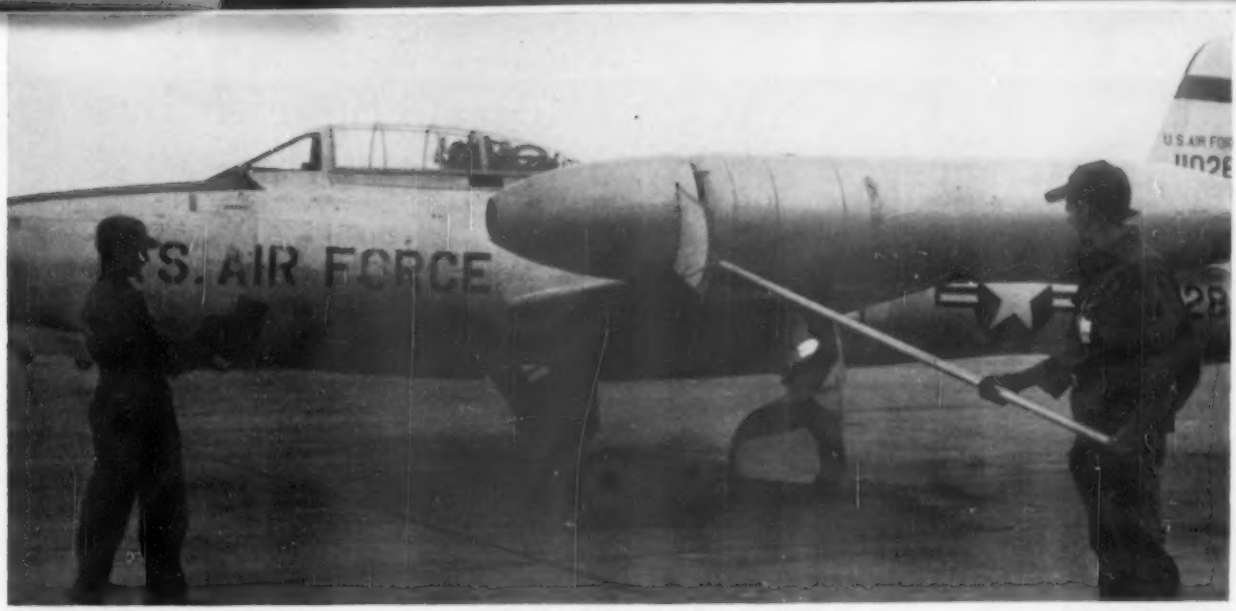
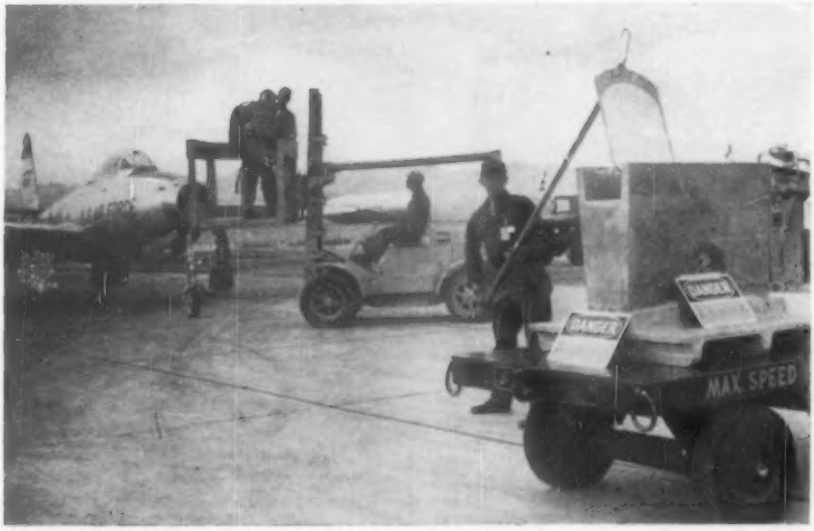


NUCLEAR RADIATION FILTER is removed from Republic F-84 at Indian Springs AFB, Nev., after sampler penetration of a blast.

Handling 'Hot' Aircraft After Atomic Tests



PARTICLE-FILLED FILTER is dropped in lead shield and sent to laboratory for tests.

LEAD PIG from drone aircraft is put in shield for shipment to lab.

F-84 PILOT is lifted from contaminated sampler with a fork lift.

COLONIAL BREAKS WORLD'S RECORD WITH AIRWORK ENGINES

Colonial Airlines remarkable record of over 25 years operation without a fatality or a serious injury gives us a thrill, too! For the past 8 years, the R-2000 engines used by this quality and safety conscious airline have been overhauled by Airwork.

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SAC to Integrate Spanish Bases Into Global Complex by 1957

Madrid—U. S. Air Force installations in Spain will be sufficiently near completion within two years to be integrated in Strategic Air Command's round-the-world string of bases.

Two of the four establishments under construction, Torrejón and Saragossa, are scheduled to be fully operational by 1957. Two others, Morón and San Pablo, will be far enough along by then to be available for emergency use.

Additional bases are planned, subject to Spanish consent. The Spanish government has authorized preliminary survey work on three new sites: at Ecija (between Seville and Córdoba), Los Llanos (Albacete) and Reus (southwest of Barcelona).

Self-Sufficient Complex

The Spanish bases complex will be an entity in itself. According to available information, a SAC Air Division Headquarters will be established here. Bombers will not be permanently assigned to what might become known as the Iberian Command, however. They will follow the peace-time rotational training system, coming here for limited familiarization periods.

U. S. Air Force interceptors will, if necessary, cover Spain against intrusion until the new American-equipped-and-trained Spanish Air Force is able to take over. At present Spain's air cover consists of obsolete propeller-driven Junker 52s, Heinkel 111s, Messerschmitt 109s, practically no anti-aircraft guns, no radar. This deficiency is gradually being remedied by the U. S. military aid program. First unit of Spanish flyers has received a year's instruction in jet flying (with Lockheed T-33s). It is planned to provide Spain with a first-installment three-wing force of about 230 North American F-86 Sabres. First deliveries are scheduled for early fall.

Strategic Advantages

The SAC bases in Spain have several strategic advantages:

- They are close to potential targets in Eastern Europe and the Soviet Union without being too vulnerably exposed.
- They supplement the SAC bases in French Morocco.
- They can compensate possible loss of availability of American bases in England. (When Britain brings its long-range bomber force to full strength, the Royal Air Force may want some of the U. K. SAC bases for its own use).
- Weather in Central and Southern Spain is clear most of the year.

Advanced Construction

Construction work is most advanced at Torrejón and Saragossa.

At Torrejón, 15 miles east of Madrid, an existing runway is being extended at both ends to a total length of 12,800 feet and broadened to a width of 200 feet. An overlay of asphalt and concrete will bring it up to strength requirements. Work has started on other pavement items, notably taxiways, and parking aprons to be provided with refueling hydrants.

Contracts for this "first-phase" construction program were awarded Sept. 25, 1954. The job is scheduled to be completed by mid-March 1956; the base will be available then for semi-operational use by SAC's heaviest bombers.

The Saragossa base will be in two sections: Sanjurjo Field presently a Spanish Air Force establishment and Saragossa's civil airport, and Valenzuela whose projected 11,500-foot runway and complementary installations still are in the drawing-board stage. Sanjurjo's apron and taxiway development, begun Sept. 24, 1954, and due to be terminated by Dec. 17 this year, had reached the concrete-pouring phase May 15.

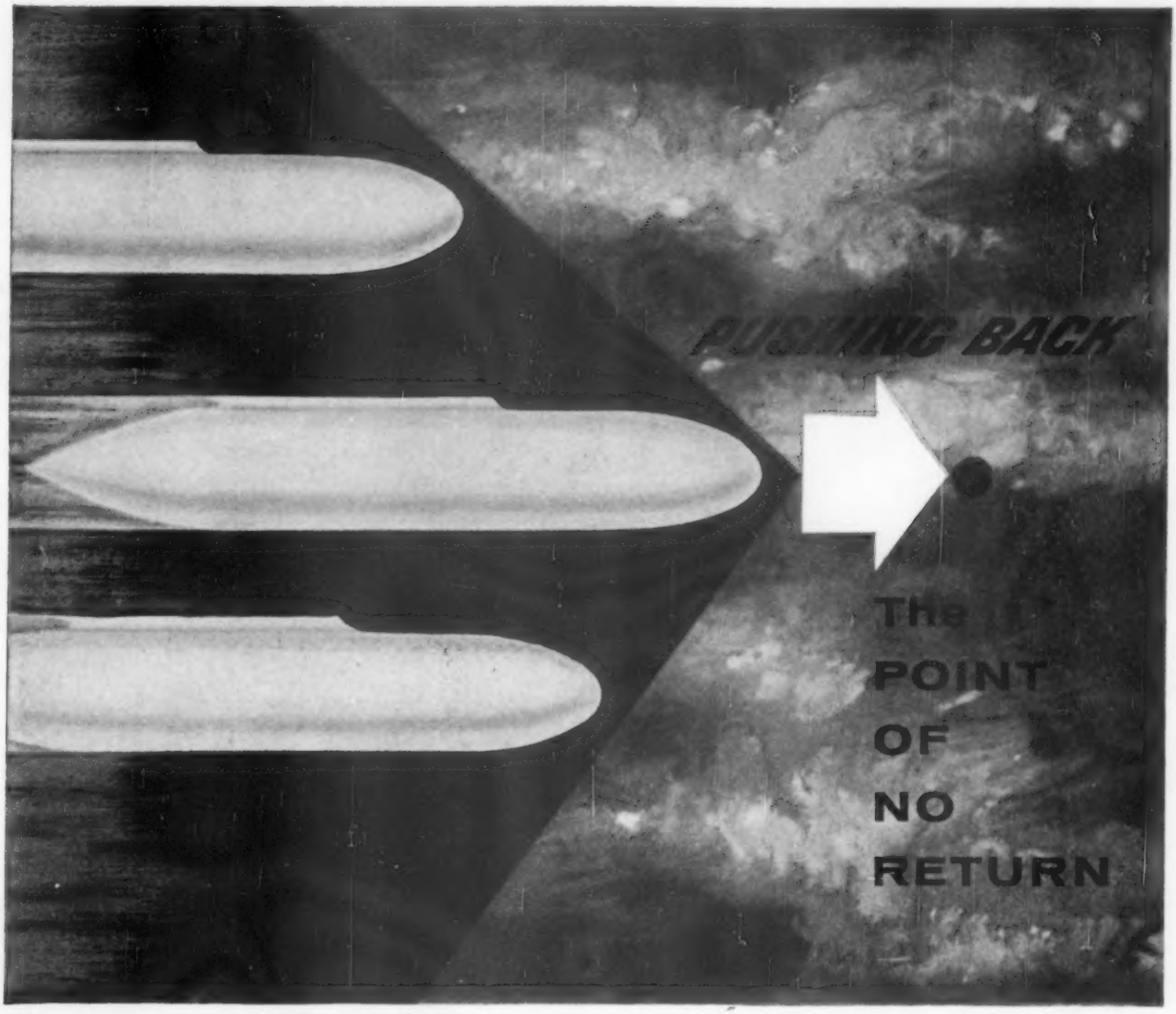
Eventually SAC bombers will operate out of Valenzuela, while interceptors and possibly long-range fighter escorts will be stationed on the adjacent Sanjurjo segment of the base.

Laboratory, Supply Depot

Work at Morón, 35 miles from Seville, has been held up because of delays in land expropriation. Construction, when it starts, will be from scratch. There is nothing now but fields, olive trees and a few farms. Contracts totaling $2.5 million for building an 11,800-foot runway, taxiways and part of the parking apron were awarded May 18.

Meantime, work has started on an office-laboratory building on the edge of the Morón site. The road connecting Morón with the Seville highway is being improved; it is in such a bad state at present that all it can handle is donkey traffic. Once begun, first-phase construction at Morón is slated to be completed in 570 calendar days.

The fourth base, at San Pablo, will not be for combat operations. It will



THE call for help went out when the prospect of global warfare required greater striking range of our military planes. Then the advent of jet aircraft—with their slim fuselage designs and extremely thin wing sections—further restricted the limits of internal fuel stowage space.

Exterior tanks, designed and built by Goodyear Aircraft, have greatly aided the solving of the problem.

Embodied in these tanks are metalworking skills and first-hand experience in a host of new materials which have provided a "fuel-proof" solution to pushing back The Point Of No Return for many of today's aircraft.

Knowledge of working with the new alloys and difficult metals, such as titanium and magnesium—coupled with our mastership of structural plastics, special coatings and bonded sandwiches—gives our experience important depth, of real value in tackling new approaches to fuel container problems.

Slosh- and vibration-testing facilities are another Goodyear "plus."

These and many other reasons account for Goodyear Aircraft's ability to team with members of the aeronautics industry in producing external tanks, jettisonable tanks, internal tanks and the like, to push back The Point Of No Return.

For complete information on how these facilities and this experience can help you, we invite you to write: Goodyear Aircraft Corporation, Dept. 931AF, Akron 15, Ohio, Plants in Akron and in Litchfield Park, Arizona.

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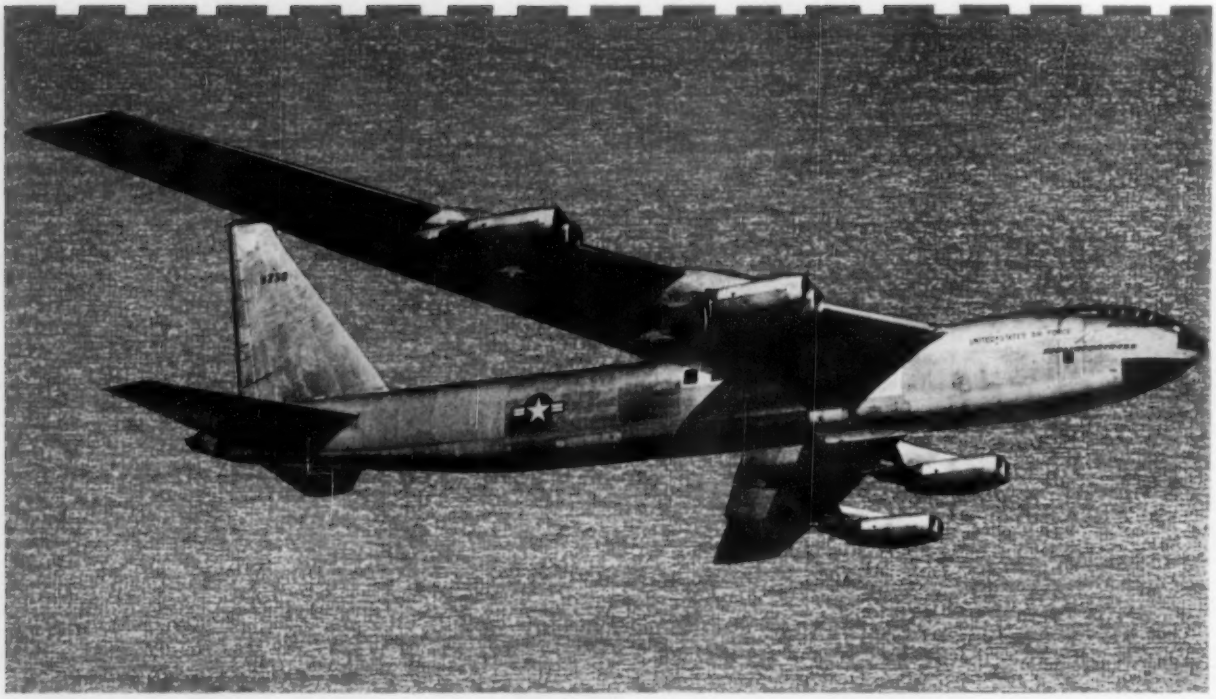
function as a supply center serving

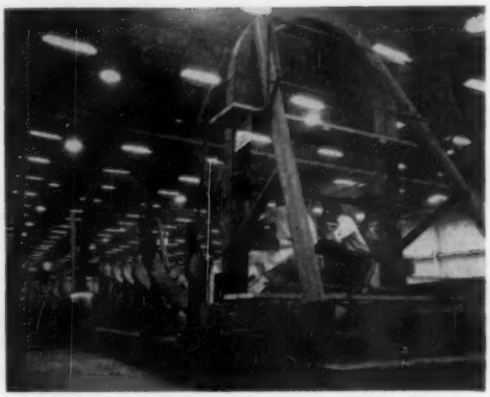


"Big Stick" . . . jet age version

TEMCO HELPS BOEING BUILD B-52 "RETALIATION" FLEET

Thunder of the Stratofort's eight jet engines is heard clearly at conference tables today, for this sleek giant can, by refueling in flight, strike with an H-bomb load at any point on earth. The threat of this fearful retaliation is impossible for an aggressor to ignore. The Air Force has ordered a fleet of these planes and they will have performed their mission to perfection if they never have to drop a bomb in combat.

Producing planes fine enough to preserve the peace is an awesome responsibility for our aircraft industry. Boeing-Wichita, in starting second source production, called confidently upon TEMCO to produce a major component of the vital B-52, for previous Boeing subcontracts on the B-47 Stratojet had firmly established TEMCO's reputation for producing a quality product, on schedule, at the lowest possible cost.



Tooling up for the B-52 job, these TEMCO workers are building the huge jigs in which major fuselage sections will be fabricated.

ENGINEERS . . . If you are interested in a position with a *growing weapon systems organization*, write full particulars to E. J. Horton, Jr., Engineering Personnel, TEMCO Aircraft Corporation, P. O. Box 6191, Dallas 2, Texas.

TEMCO
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function as a supply center serving other SAC installations in Spain. San Pablo is Seville's airport and is well provided with serviceable runways. SAC's Air Materiel Depot, as it will be called, still is in the planning stage.

Construction of a 10-inch 500-mile-long fuel pipeline to feed the air bases started at the end of May. Extending from the now-building Naval Port and Air Station at Rota, near Cadiz, the pipeline will terminate at Saragossa. Extensions will be added to connect it with present bases and any others that may be built. Building time: 425 days. Subterranean tank farms will have a total fuel storage capacity of 4.5-million barrels.

Protective radar screen is slated to begin forming in June.

Planning Program

Overall coordination of the bases program in Spain is the responsibility of Maj. Gen. August W. Kissner (USAF), chief of the Joint United States Military Group here and direct representative of the Secretary of Defense.

Planning is done by Architects-Engineers Spanish Bases (AESB), a combination of four American architectural-engineering firms. Selected by a joint Navy and Air Force board, the four are: Metcalf & Eddy; Frederick R. Harris, Inc.; Shaw, Metz & Dolio and Pereira & Luckman.

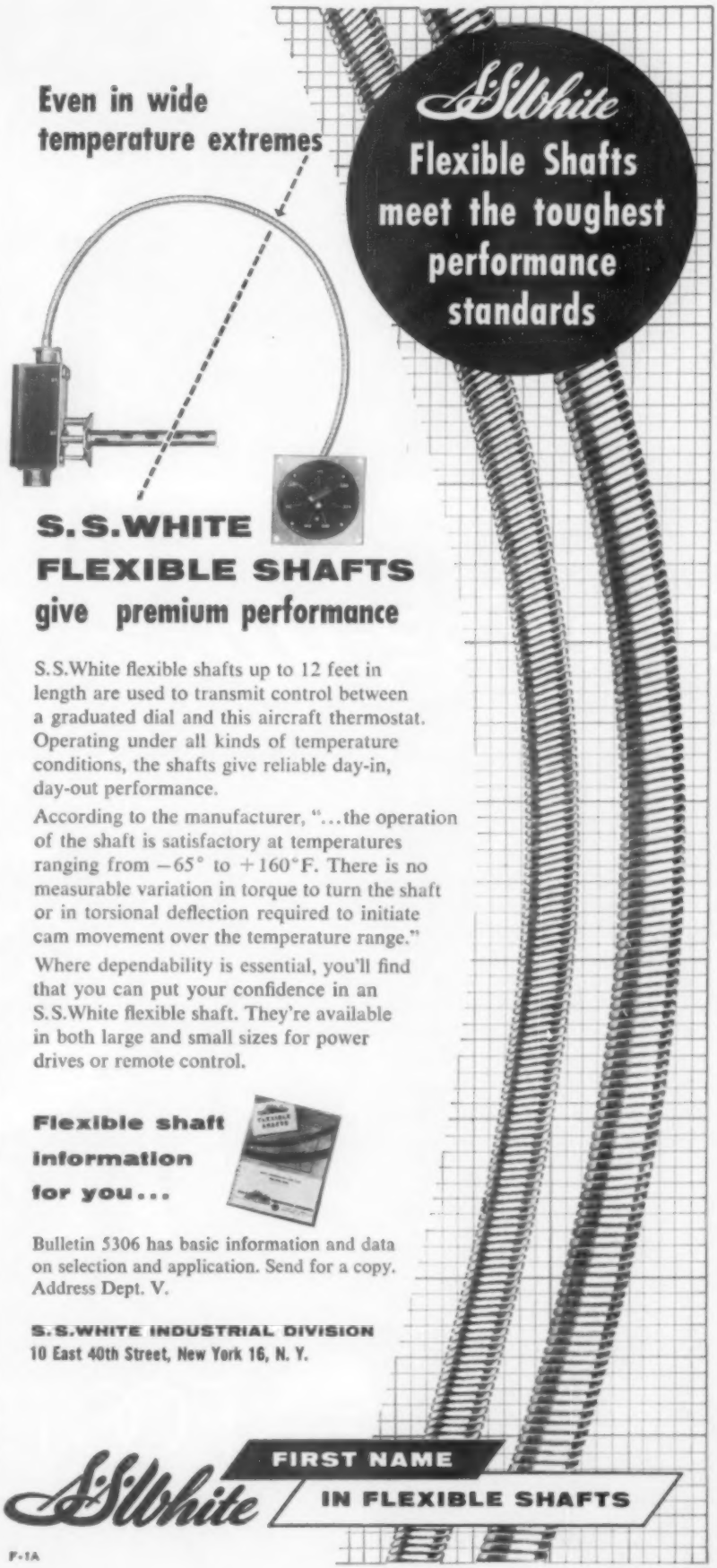
Supervision of construction is in the hands of the U.S. Navy's Bureau of Yards and Docks. Prime contractors are Brown-Raymond-Walsh (Brown & Root, Inc.; Raymond Concrete Pile Co.; Walsh Construction Co.). Subcontracts are let to Spanish firms if they are able to do the job. Spanish labor is employed.

Under the terms of the accords signed with Spain Sept. 26, 1953, the bases are to be operated jointly by Spain and the United States. The bases pact is for a period of ten years extendable by mutual agreement for two successive periods of five years.

Wartime use of the bases by the U. S. Air Force is subject to Gen. Franco's consent. Article 3 of the Spanish-American Defense Agreement says: "The time and manner of wartime utilization of said areas and facilities will be as mutually agreed upon."

Convairs Replaced

Pan American World Airways is replacing Convairs with DC-6B equipment on its Miami-San Juan run. The Super-6 will make daily flights via Camaguey, Montego Bay, Kingston, Port au Prince, Haiti and Ciudad Trujillo.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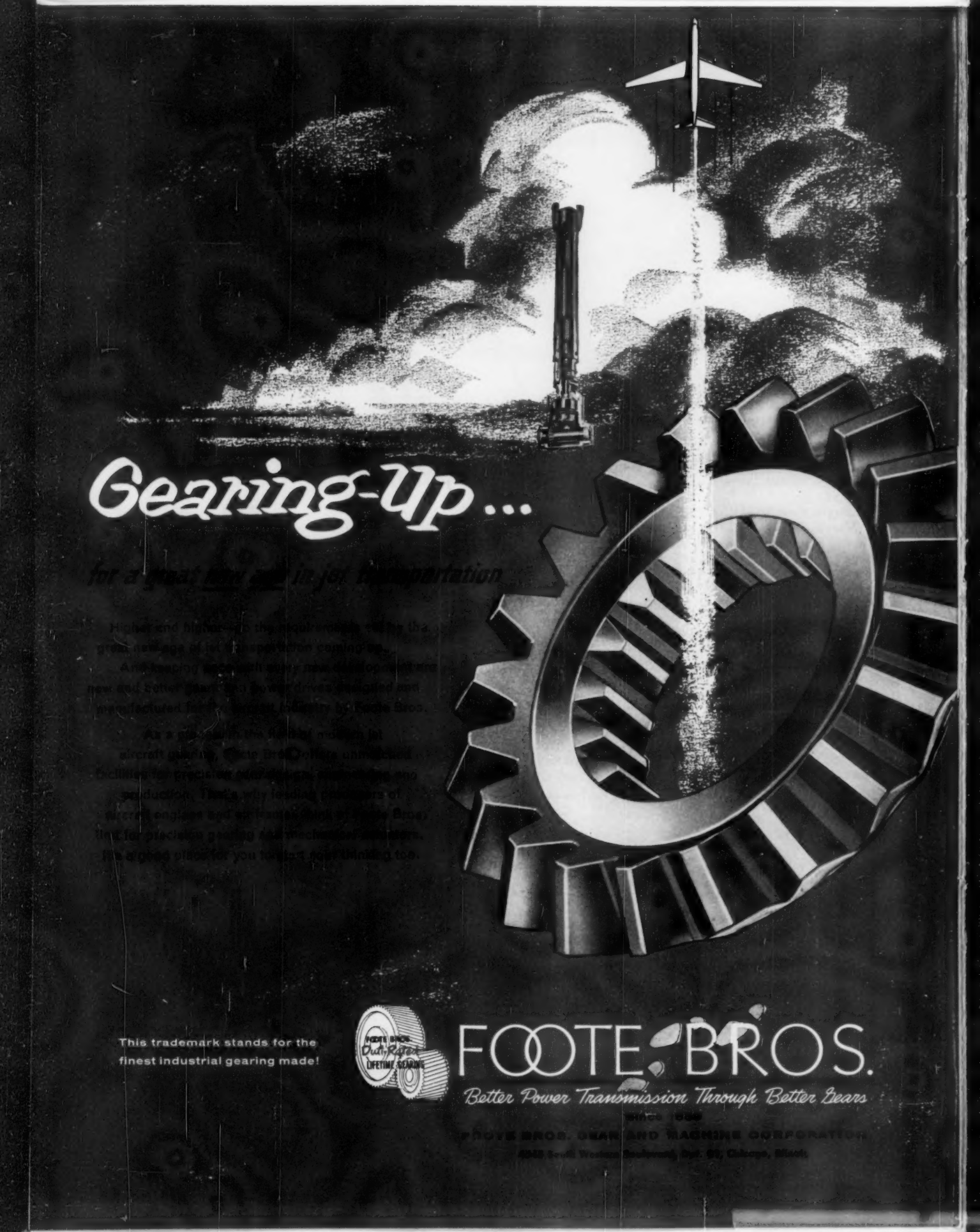
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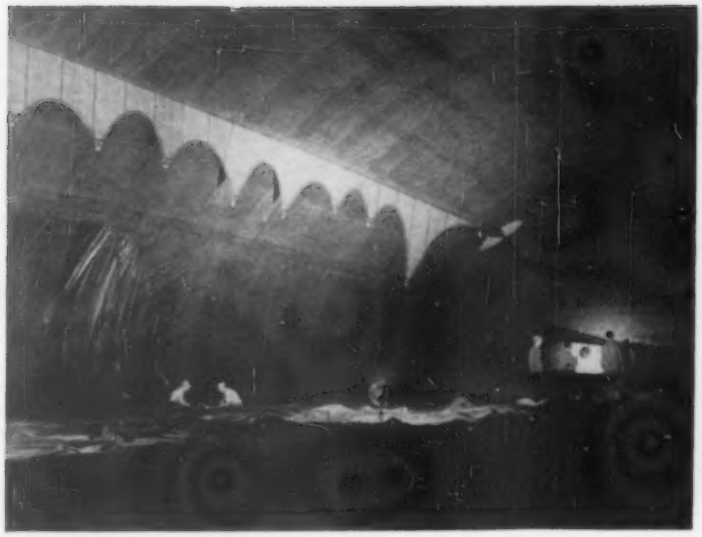


GOODYEAR PROJECTS cover a wide range, including 1-man GA-400R copter, airship program (gas bag inspection shown above), and . . .

HIGHSPEED TOW TARGET capable of 500-mph. flight behind a B-47, and extensive plastics production, such as radomes at right.

GAC Banks on Diversity and Research

By Henry Lefer

Akron—The aviation company that depends largely on subcontracts is somewhat like a man balanced on a high ledge. Any sudden shift in the wind may topple him.

In the aircraft industry, these shifts are likely to be the result of changes in defense procurement.

Cancelation of prime contracts naturally washes out associated subcontracts. Or a prime may find that cutbacks leave him with insufficient work for his engineers and production personnel, and reduces subcontracting to keep his own team busy. Or the prime may feel that he can maintain better profit margins by doing the work in his own shops.

Goodyear Aircraft Corp., which depends to a large extent on subcontracts, has felt these sudden chill gusts. The solution, as seen by GAC's management, is diversification and development of the company's own products.

A primary part of the solution is a constant attack against what T. E. Knowles, vice president and general manager, calls the "factor of ignorance," smoothing off the rough edges that keep us from getting top performance and value from present materials, techniques and structures.

Covers the Field

Goodyear Aircraft Corp. is a wholly owned subsidiary of Goodyear Tire & Rubber Co. Although the company does not break down its operating figures for subsidiaries and divisions, some indication of GAC's size may be gathered from employment statistics. The Goodyear empire had 96,000 on its worldwide payroll in 1954, with about 75,000 in U. S. plants. Of this total, Goodyear Aircraft employed 12,000–10,000 at Akron and 2,000 at Litchfield Park, Ariz., and Radford Arsenal.

So, perhaps a fair guess would be that GAC was responsible for one-fifth to one-tenth of the company's 1954 sales of $1.1 billion. Goodyear Tire & Rubber had its peak year in 1953, when sales totaled $1.2 billion, but on the basis of first-quarter reports may exceed that this year.

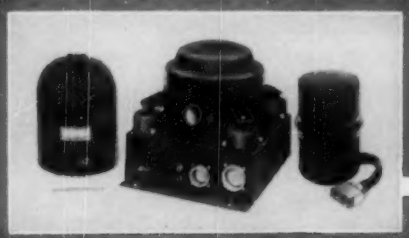
In keeping with its policy of diversification and research, GAC maintains a sizable staff of engineers. A glance at

One of a series telling

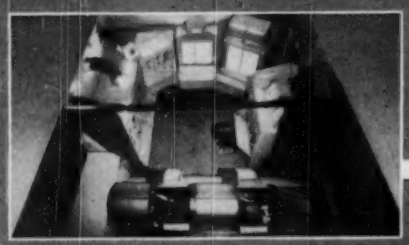
GPE

serving industry through

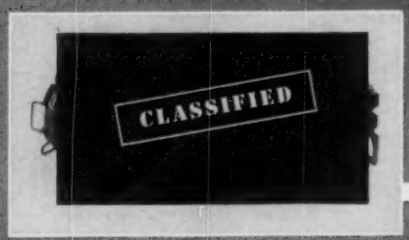
coordinated precision technology



Inertial gyros, used for stabilization of guidance in the majority of aircraft and missiles in production today. Vertical, directional and rate-integrating gyros shown.



Link Aviation F-89D; jet flight simulator duplicating exactly cockpit of the F-89D interceptor; Link simulators for more advanced planes may not be shown.



Automatic Airborne Navigation System; a product of the coordinated techniques and resources of General Precision Laboratory Incorporated and other GPE Companies.

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is one of more than a dozen major industries many of whose needs are anticipated and met by the research and development activities of the producing companies of General Precision Equipment Corporation. The highly advanced aeronautical products and systems manufactured by the several GPE Companies which devote substantial resources to progress in this field are responsible for conspicuous advances in aviation and are setting new standards of performance.

The skills and resources of the producing companies of General Precision Equipment Corporation form the building blocks of GPE Coordinated Precision Technology. Through this basic GPE operating policy, each company's specialization in its areas of competence is supplemented by the resources of other GPE Companies, wherever relevant. An outstanding example of GPE Coordinated Precision Technology is the recent achievement of quantity production of the most advanced automatic airborne navigation system known. This system is the successful culmination of eight years of intensive research and development activity centered in General Precision Laboratory Incorporated and supported by the facilities and personnel of other GPE Companies.

This mutuality of ideas, techniques and tools, so effective in solving aviation problems, has likewise resulted in a diversified line of precision equipment of superior design and performance which has wide application over an extensive range of other industries.

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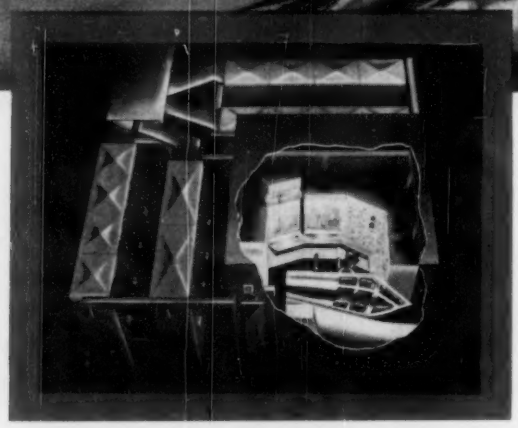

Developed under basic Link patents, the F-102 Jet Flight Simulator duplicates exact flight conditions of the famous Convair Delta-Winged Interceptor.

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An arsenal on wings, the USAF's newest jet fighter, the F-102, flies through space at supersonic speeds and packs the fighting punch of a thousand bolts of lightning!

But, new developments in aircraft make new demands on men. And, to help train the pilots who will fly this delta-winged jet in the defense of America, Link has developed the first F-102 jet flight simulator.

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As man shrinks horizons, Link keeps pace with progress. Wherever men are planning today to conquer tomorrow's skies, you'll find Link.

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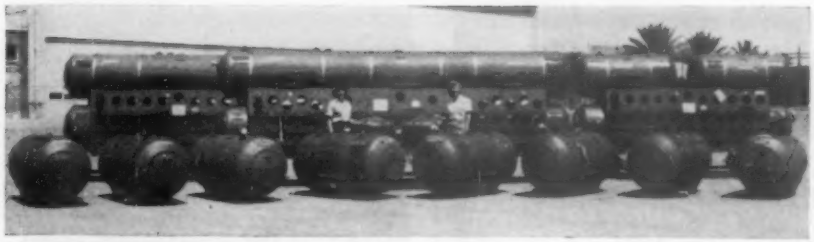

LINEUP SHOWS FUEL TANKS made by Goodyear for a single KC-97G aerial tanker.

the Help Wanted columns of Akron newspapers indicates that outside aircraft companies are aware of this and eager to offer some of these engineers a new home.

GAC's diversification program has carried it into many fields. The company's prime products are airships, Nike missile booster cases and Geda electronic brains.

As a subcontractor, it produces items for nearly every plane flying—including wing and empennage assemblies, radomes and other plastic structures, optical canopies for bombers and fighters, metal tanks for fuel in flying tankers, droppable metal fuel tanks, missile guidance systems, ground radar antennas and ground-handling equipment.

The company has developed an operational flight trainer for a military aircraft. It has two jet thrust reversers under development—one aerodynamic and one mechanical. The military is testing its highspeed all-metal tow target and its ejectable escape capsule for crews of supersonic aircraft. The company is running tests on its recently developed one-man helicopter. Its foundry reports promising progress in pouring precision castings, including some with avionic applications.

Stress on Plastics

GAC has made heavy investments in plastics. Recent installation of five new presses—one 700-tonner, three 300-tonners and one 100-tonner—is an example of the company's continuing drive toward diversification.

In addition to its aviation plastic products, Goodyear is punching out one-piece glass-reinforced plastic hulls for speedboats. It has a contract to produce glass-plastic automobile bodies. It is making glass-plastic fertilizer hoppers for International Harvester farm tractors.

A tour of the company's plastics facilities, believed by Goodyear to be among the largest in existence, discloses an impressive number of projects.

GAC produces the cockpit canopies for B-47 Stratojets built by Boeing as well as Douglas and Lockheed. Laminated Plexiglas, consisting of two outer layers of Rohm & Haas's Plex 55 cemented to a Butacite filler (to make the canopy shatterproof), is given its required contour under heat and pressure in a special jig. Then Goodyear attaches the metal frame and trim and covers the optically clear canopies with a protective plastic to guard against scratching and damage before installation.

A new Goodyear development eliminates the need for sandwich construction to make aircraft canopies shatterproof. GAC makes Plex 55 shatter-resistant by stretching it 100% in length and width (AW March 21, p. 10). A full-scale canopy of Plex 55 has already been made this way for the Republic F-84F, working with a 1-in.-thick sheet of material and reducing it to a uniform ¼-in. thickness during the stretching. R. W. Dunmire, assistant manager of the canopy and laminates division, says the process will also work with other thermoplastic materials. Successful half-scale tests have been conducted with General Aniline's Gafite.

Goodyear designs and builds the canopy for the Northrop Scorpion, from the F-89C model onward. The company says there have been no unsatisfactory reports (URs) from the field in the three years the canopy has been out. The company also makes canopies for the Convair F102 (also windshield) and the Republic F-84F, and designed and built the elliptically shaped canopy used on Convair's vertical riser, the XFY-1 Pogo.

Dr. Karl Arnstein, vice president-engineering, says GAC's knowhow in combining plastic and metal structures enables it to build the complete canopy "package."

Goodyear has designed a plastic escape panel to permit downward ejection from the B-47. The panel has to be made strong enough to serve as part of the Stratojet's belly, yet weak enough to rupture harmlessly when hit by the ejecting crewman. The panel has been turned over to Air Force for evaluation.

Many glass-plastic radomes now flying are GAC products. In addition to the giant belly unit on its own S-type anti-sub airships and the dorsal radome on the AEW (aircraft early warning) ZPG-2W blimp, Goodyear makes reinforced plastic radomes for the Douglas B-66 bomber, Chance Vought F7U-3 Cutlass, the Douglas C-124 Globemaster, the B-47, and Grumman's S2F sub-killer (for which GAC also makes

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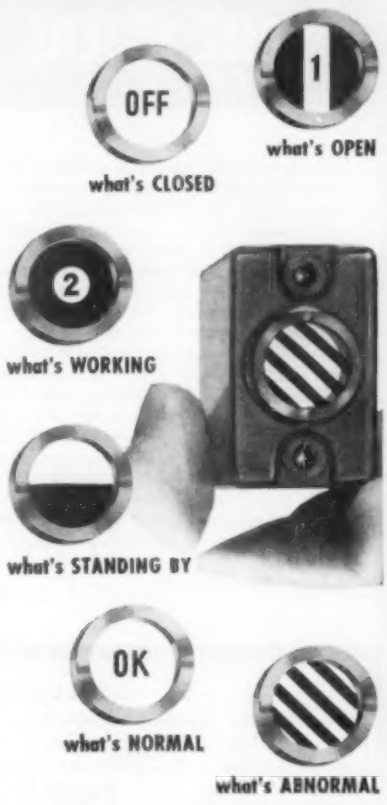

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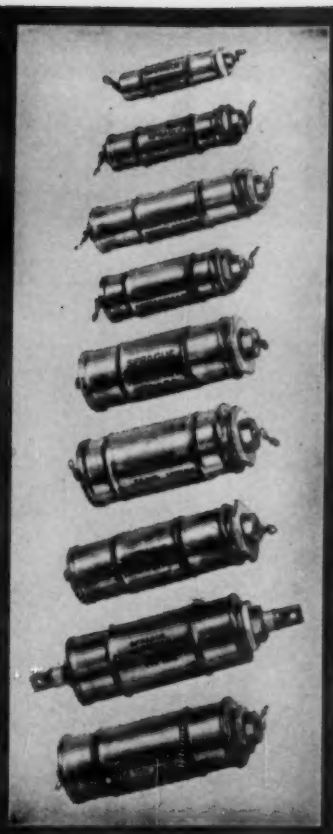

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RATING		CATALOG NUMBER	CHARACTERISTICS							
CURRENT (AMPS)	VOLTAGE FREQUENCY		WEIGHT (OZS.)	SIZE (DIA." X LENGTH")	INSERTION LOSS (DB) AT GIVEN FREQUENCIES (MC) (50 OHM SYSTEM)					
					.15	.5	1	10	100	400*
0.1	125VDC	1JX54	1.5	3/8 x 1 3/8	63	100	100	112	>84	>80
1	125VDC	1JX36	2	3/32 x 2 1/4	56	81	>100	86	>90	>73
1	125V/400CY 400VDC	1JX42	5	3/32 x 2 13/32	50	79	96	97	80	>56
5	125V/400CY 400VDC	5JX15	6.5	1 3/32 x 3	60	90	>112	100	>70	>70
5	125VDC	5JX18	3.7	3/32 x 3 1/8	59	89	> 95	>105	>90	>73
10	125V/400CY 400VDC	10JX15	8.5	1 1/32 x 3 3/32	59	88	>100	87	>80	>79
10	125VDC	10JX16	7.5	1 3/32 x 3 1/4	74	106	>109	>113	>93	>81
20	125VDC	20JX14	9	1 1/32 x 2 13/16	57	88	>103	> 99	>90	>83
20	125V/400CY 400VDC	20JX15	10	1 1/8 x 3 3/32	56	88	>100	>114	>83	>60

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GEDA electronic 'brain' was originally developed by Goodyear Aircraft to meet its own needs. Shown is N3A multiplier.

plastic fin caps for the vertical stabilizer). Goodyear also produced radomes for Convair's B-36.

The radomes consist of void-free skins made of glass-fiber-reinforced polyester resins molded in matched dies, with a foamed-in-place core. The radomes are generally cured under heat and ultraviolet lamps which trigger a photo-sensitive catalyst that starts polymerization. Skin thickness is maintained within ±.005 in.

To make these radomes impervious to rain erosion, GAC developed a special coating, which it calls 23-56.

Among GAC plastics accomplishments is production at Litchfield Park of high-strength laminated plastic blades for a sonic windtunnel fan, the first successful application of the material for this purpose, according to the company.

Avionics & Electronics

In response to GAC's own needs, company engineers designed and built the Geda (Goodyear Electronic Differential Analyzer) analog computer and its associated equipment. Now it is being sold to universities and industry research groups. Price of a basic Geda is about $15,000. Complete installation, including the basic GN-215-L3 linear analog computer plus other units, runs to about $40,000.

The L3 can solve 12th order differential equations involving 10 initial conditions. Its utility is expanded by addition of the N3 non-linear analog computer, incorporating as many as ten N3A multiplier units; R5 six-channel recorder or R3 two-channel portable recorder; T1 curve plotter and M1 impedance bridge.

Among the problems Geda can solve are those dealing with stability and dynamic performance, servomechanism design, automatic regulation and control, jet engine testing, helicopter vane and turbine design, dynamic stresses of moving parts, fluid and heat flow, hom-

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Silicone News

FOR DESIGN ENGINEERS

Founder Celebrates 25 Years' Service To Silicone Industry

In 1930, Dr. J. F. Hyde first started his investigations into the field of organosilicon chemistry. His work, which preceded that of any other chemist in this country, led to the first commercial production of silicones.

Frank Hyde received a master's degree in chemistry from Syracuse University in 1924. He then enrolled in the graduate school of the University of Illinois and received his Ph.D. in organic chemistry in 1928. To pursue still further his interest in basic organic chemistry, he spent two years as a post Doctorate Fellow at Harvard University under Dr. J. B. Conant.

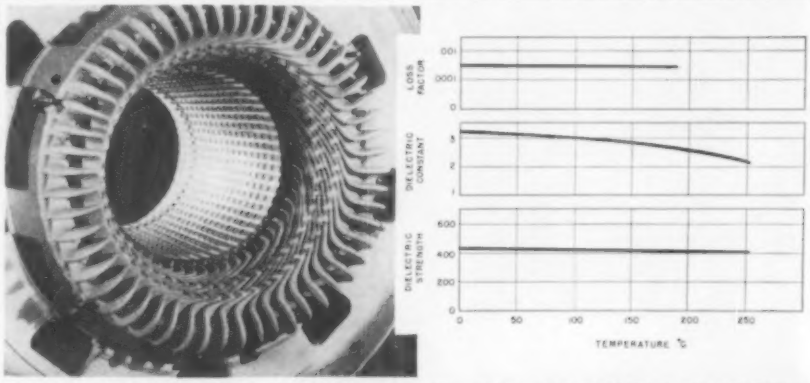
DR. J. F. HYDE

Hyde's work in the field of silicone chemistry began the day he was hired by Dr. E. C. Sullivan of Corning Glass Works in 1930. His first project was to explore the possibility of incorporating organic chemical groups into glass compositions to increase their shock resistance and flexibility. His investigations led deep into the work done by Prof. F. S. Kipping of Nottingham University (England) in the field of organosilicon chemistry. Applying his creative imagination to Kipping's findings, Hyde produced silicone polymers with the very properties that so rapidly propelled the silicones into almost every phase of American industry.

Frank Hyde carried on basic exploratory work in the silicone field at Corning until 1951. He then transferred his laboratory to Midland, Michigan, to be closer to actual silicone operations at Dow Corning Corporation where he continues to apply his research ability to producing more and better silicone products.

At this time, many people join us in saying,

CONGRATULATIONS TO THE MAN WHO WAS FIRST IN THE WORLD TO PRODUCE A USEFUL SILICONE AND ON WHOSE WORK AN INDUSTRY WAS FOUNDED
DR E C SULLIVAN



ALLIS-CHALMERS ANNOUNCES ALL-SILICONE-RUBBER INSULATION FOR LARGE MOTORS AND GENERATORS

Allis-Chalmers Manufacturing Co. has announced development of the first all-silicone-rubber electrical insulating system for large motors and generators. Known as Silco-Flex, this new Class H insulation increases the life and efficiency of rotating electric machines by providing greater overload protection and maximum resistance to abrasion, moisture, shock, and vibration.

Made with Silastic*, the Dow Corning silicone rubber, Silco-Flex is dielectrically superior to all types of resinous insulations. As shown in the figure, dielectric strength of 1/16 inch slabs cured 24 hours at 250 C remains practically constant over a temperature span ranging from 0 to 250 C. Dielectric constant decreases gradually from 3.2 to zero to 2.2 at 250 C.

In manufacturing Silco-Flex insulated stator coils, Silastic is applied to the conductors and vulcanized into a homogeneous mass by the application of heat and pressure. This produces a continuous and impervious dielectric barrier which provides a flexible, moisture and heat resistant wall over the entire coil structure including leads.

Silco-Flex insulation is expected to change many of the motor application practices in the utility and industrial fields. In power plant induced draft fan motors, for example, the abrasive effect of atmosphere-borne cinder and fly ash will have little effect on the resilient all-silicone-rubber system. Motors in cement, ore crushing and similar installations will retain high overload capacities despite reduced ventilation resulting from dust accumulation in ventilating passages. In the chemical, paper, food and similar industries, applications that formerly required totally enclosed motor frames may now be supplied more efficiently and economically with Silco-Flex insulated semi-protected or open type frames.

Allis-Chalmers is already building large Silco-Flex insulated machines in the 2300 and 4000 volt class. These will be priced on the same basis as pervious units constructed with resinous Class H insulation. A-C engineers also expect to extend the advantages of the all-silicone-rubber system to a wide range of high and low voltage rotating equipment. *No. 41*

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Provides a heading reference with a drift rate of 1/10° per hour when used as a directional gyro.

Functions as a True North Seeking Compass at an accuracy of 1/4° when used as a gyro compass.

A brochure describing the Arma Subminiature Gyro Compass will be sent to personnel engaged in military applications, by writing Dept. KB-3, Arma, Garden City, New York.
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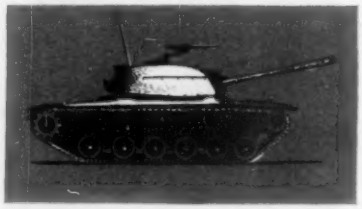

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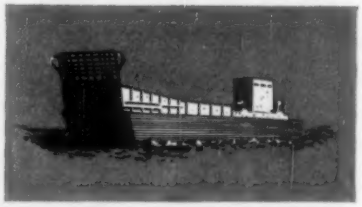

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3216

ARMA ADVANCED NAVIGATION SYSTEMS

ing and seeker systems, and fire control.

GAC is a busy subcontractor in the avionics field. The company has designed and is building for General Electric the antenna for the FPS-6 height-finder radar, with its 30-ft. reflector dish.

Another project is the antenna for a Bendix surveillance ground radar. Strong enough to withstand 75-knot winds, this unit can be "knocked down" and is light enough for air shipment.

Goodyear is also working on missile guidance systems and produces sonobuoy tubes.

Metal & Missiles

After some time, the company has been permitted to reveal its part in the Nike production program. Both at Akron and Radford Arsenal, Va., Goodyear is making Nike booster casings in large quantities for Army Ordnance.

In forming the booster case, GAC rolls a sheet of high-strength steel into a cylinder and seam-welds it. The company's ability to produce a casing of strength equal to the original sheet played a major part in landing the order, says Bob W. Richardson, vice president-sales.

The company built a steel-framed plant at Akron with its own funds to handle Nike production.

Goodyear produces wings and empennages for the T-28 trainer, under subcontract from North American Aviation.

This work is done at the Litchfield Park plant.

Under present schedules, the contract will extend into 1957.

Boeing's KC-97G tankers carry the fuel for inflight refueling of thirsty jets in Goodyear-built metal tanks. Each plane carries 15 tanks, of several sizes.

In addition, GAC makes jettisonable metal wingtanks for the B-47.

Airship Program

As in the past, production of airships for the Navy is one of Goodyear's major production programs. Both the Akron and Litchfield Park plants are involved. Metalwork and cabin construction are handled at Akron, and the gas bags and envelope at Litchfield. Assembly is in the huge, 364,000-sq. ft. airdock at Akron.

The company is now working on both S (scout, short-range) and P (patrol, long-range) airships for anti-sub and aircraft early warning missions.

The airships—GAC engineers wince at the word "blimp"—are of semi-rigid construction: the nose and tail sections are rigid, the large lifting section in the center is non-rigid. The car is supported by a system of steel cables laced through the top and bottom of the rubberized-fabric envelope.

The metal framework of the control car is built in several assemblies, which are then joined. Goodyear's Bondolite sandwich—in this case, aluminum alloy facing with balsa core—is used extensively in the car.

Sandwiches

Goodyear produces its Bondolite panels with various face and core materials and with both square and hexagonal honeycomb cells.

Cores are made of solid balsa wood; aluminum foil, stainless steel, fiber glass, paper or cotton honeycomb; and foamed or cellular material. Face materials include aluminum (structural and non-structural applications), stainless steel and titanium (where high strength and heat- and corrosion-resistance are wanted), magnesium (low-density, high-stiffness applications), resin-impregnated glass cloth (radomes), and paper (baggage racks, partitions, non-structural applications).

GAC used Bondolite (aluminum-honeycomb type) in primary wing structure on its GA-22A Drake business transport design. The company says the Drake is the first civil aircraft using honeycomb material for primary structure to get CAA certification.

As a subcontractor for Piasecki in

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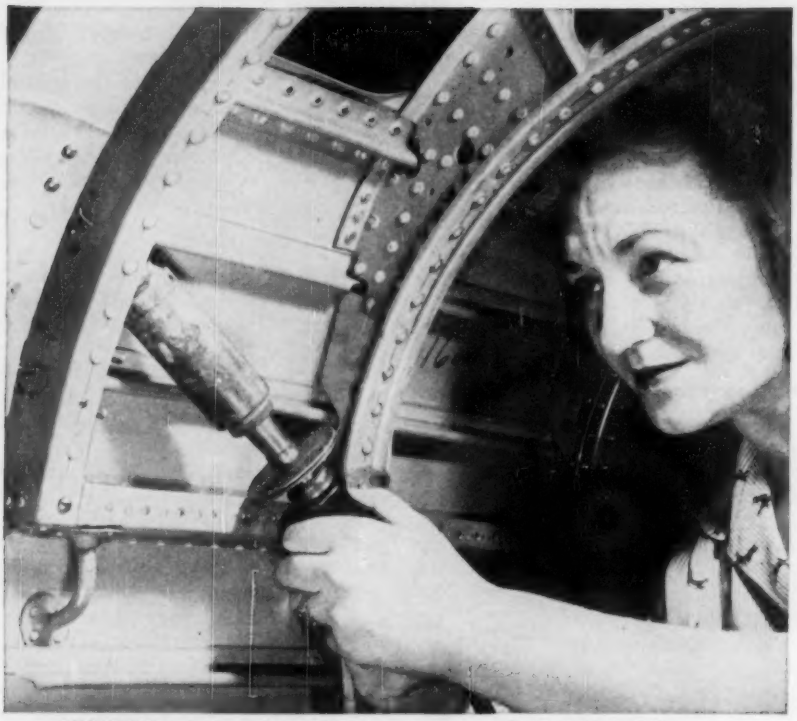

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In fact, Rivets are so easy to use 15 to 20 a minute can be set down "blind." Simply insert in drilled holes, apply heated irons to head. Rivet expands, fills holes almost instantly, locks parts solidly together. That's all—no expensive after-finishing required.

Rivets are designed for both primary and secondary applications. Use them now... reduce your time, labor and cost on fastening jobs from nose to tail. You can do it fast... keep 'em fast with Du Pont Aircraft Rivets. For information and specifications on these sturdy, one-piece fasteners, write E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

HOW DU PONT AIRCRAFT RIVETS WORK

1. RIVET is inserted in drilled hole. Cross section shows cavity in shank containing tiny explosive charge.

2. TIP of electrically heated Du Pont Riveting Iron is applied to Rivet head, firing charge. Barrel-shaped head at shop end locks Rivet securely in place.

DU PONT AIRCRAFT RIVETS

DU PONT REG. U.S. PAT. OFF. A Product of Du Pont Research

BETTER THINGS FOR BETTER LIVING... *THROUGH CHEMISTRY*

the H-21 helicopter program, Goodyear used balsa-core Bondolite extensively in the copter's shell.

Other Projects

Among recent GAC projects that show promise are these:

• **Highspeed tow target.** This all-metal, 1,400-lb. craft can be towed behind a B-47 at speeds over 500 mph. By means of offset-towing to one side of the B-47, close simulation of a jet fighter pass is permitted.

The target ship lands on skid-type runners and is slowed by a drogue parachute when the tow cable is released. Repeated re-use is possible.

A small dorsal air-driven generator provides power to operate as-yet-undisclosed devices on the craft

The tow target, designed and built by GAC in cooperation with the Armament and Tow Target Unit of WADC's Equipment Laboratory, is now undergoing extensive Air Force tests.

• **One-man copter.** Goodyear says the military is interested in the GA-400R, one-man copter built with its own money. It could be used as a courier vehicle or for tactical assault by ground troops (AW May 30, p. 7).

Key consideration in design of the 400-lb. craft was to come up with an item that could move into production quickly and easily, so emphasis was put on use of commercially available materials. Powerplant is a water-cooled 25-hp. Johnson Seahorse outboard motor, souped up to 33 hp. The airframe is of welded aluminum tubing, supported by steel outrigger tubes on aluminum skid alighting gear.

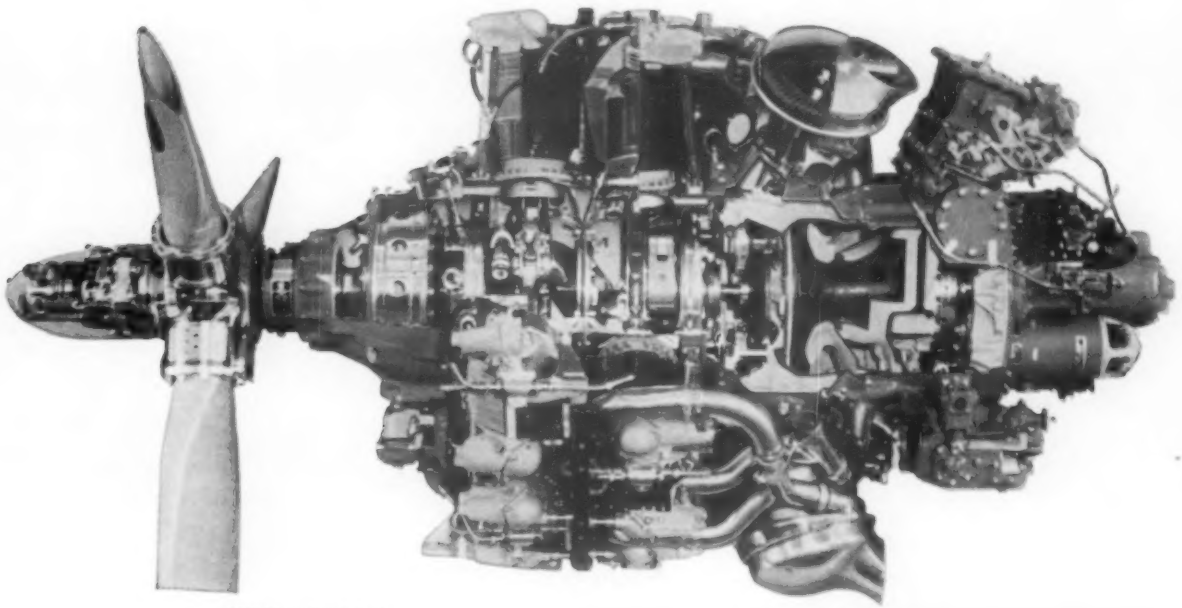
Main rotor has two laminated wood blades mounted in steel hub underslung from teetering hinge. Two-bladed tail rotor, operated through rudder cables connected to its collective pitch mechanism, is of formed aluminum sheet. Overrunning centrifugal clutch gives smooth starts and free wheeling on loss of power.

The copter, capable of 60-knot speed, was designed, built and flown in 10 weeks. Designer is Paul Ziegler.

• **B-52 towbar.** GAC's Arizona plant has a contract for production of B-52 Stratofortress tow bars. This is the first time Litchfield Park has made ground-handling equipment. Other projects at this plant are production of optical canopies, reinforced plastic parts, airship envelopes and gas bags, electronic subcontract work and T-28 assemblies.

Executive Fleet

Goodyear Tire & Rubber owns one of the nation's largest fleets of executive aircraft, between 30 and 40 at present. The Aviation Products division is responsible for the fleet, which

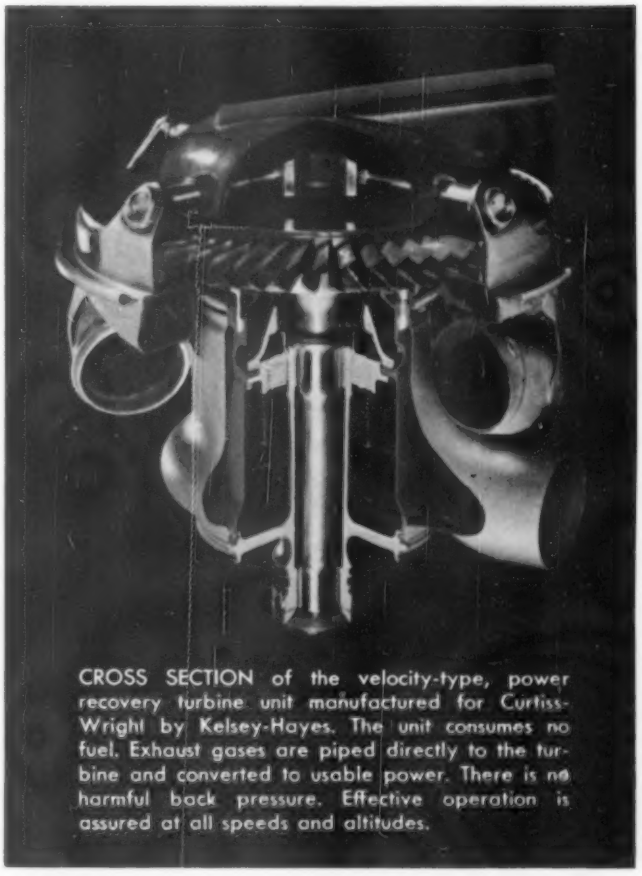


CURTISS-WRIGHT
Turbo Compound Engines are in use by 30 World Airlines plus leading military aircraft

Kelsey-Hayes helps put 20% power bonus into Curtiss-Wright engines

One more example of Kelsey-Hayes diversity at work for major industries throughout America

Any way you translate it—*20% longer range, 20% less fuel, 20% more payload*—power recovery turbines on the Curtiss-Wright Turbo Compound engine mean greater operating economy. The entire power recovery unit—requiring 2000 close tolerance machining operations—is manufactured to highest engineering standards by the Kelsey-Hayes Wheel Company, Detroit 32, Michigan.



CROSS SECTION of the velocity-type, power recovery turbine unit manufactured for Curtiss-Wright by Kelsey-Hayes. The unit consumes no fuel. Exhaust gases are piped directly to the turbine and converted to usable power. There is no harmful back pressure. Effective operation is assured at all speeds and altitudes.

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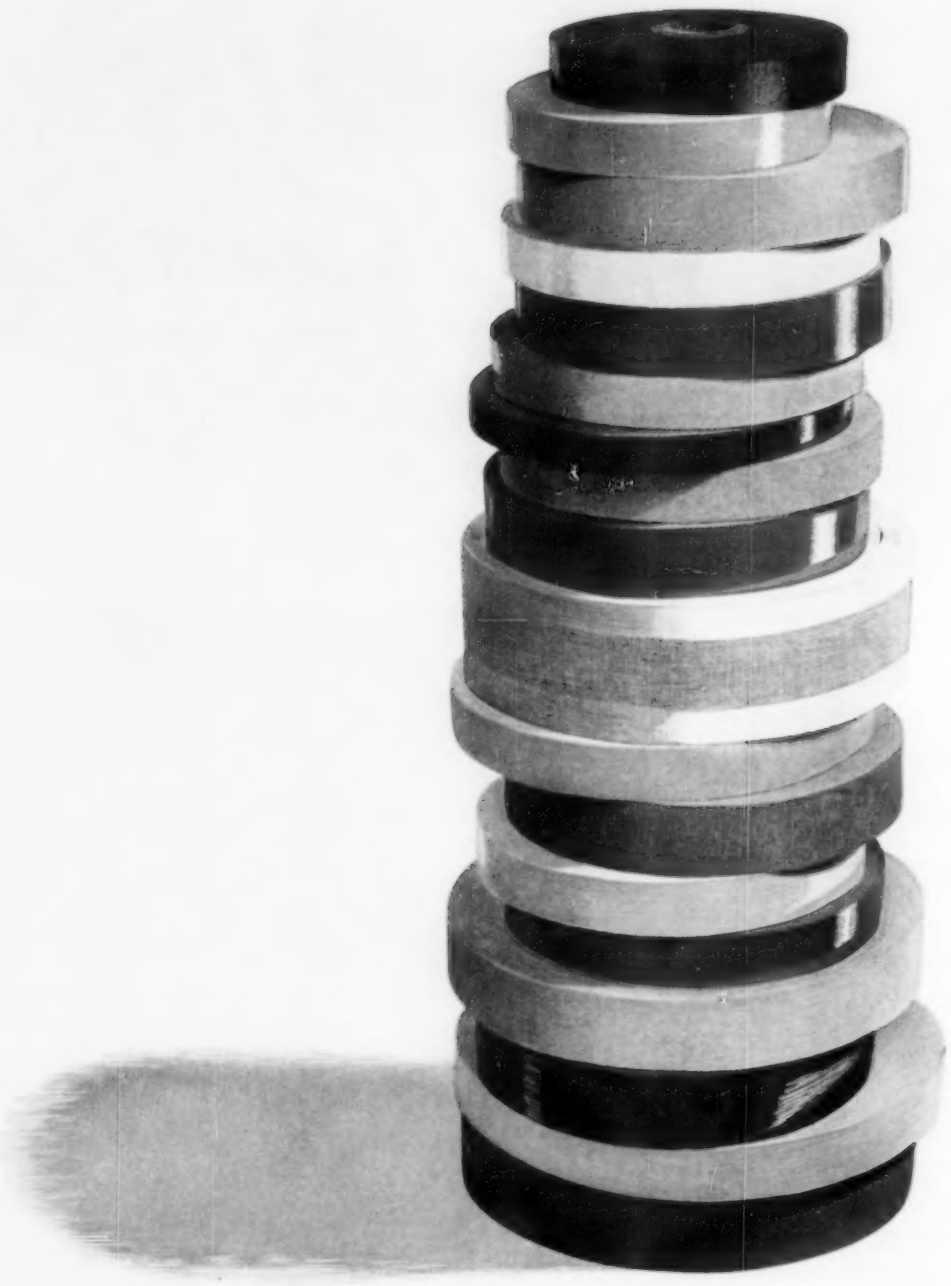

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AERONAUTICAL ENGINEERING

includes four Lodestars, a DC-3, a twin-engine Beechcraft, Bonanzas, Cessnas, a Stinson, six amphibian Ducks and two Drakes. Goodyear also has a number of aircraft on loan from the government for special projects. A crew of 11 mechanics and radio specialists maintains the business fleet.

In addition Goodyear maintains two 123,000-cu. ft. blimps—the Enterprise and the Ranger.

The Aviation Products division, which comes under the parent company and is separate from Goodyear Aircraft Corp., includes among its products aircraft brakes, wheels, tubes, tires and master cylinders; landing floats for helicopters and land and sea planes; all types of aviation hose; Airfoam products for aviation; Pliocel and bullet-sealing fuel and oil cells; propeller and wing iceguards; and custom-molded rubber products.

Soviets Build Up Industrial Base

Two related reports from official Russian sources underscore the size of the industrial base for Red airpower:

• Aluminum production has more than doubled since 1951.

• Airport terminal construction has been approved for 20 major Russian cities.

The government newspaper Izvestia says aluminum output increased 140% from 1951 through 1954 (the first four years of the fifth Five-Year Plan). For 1955, a further increase of about 10% is planned.

A U. S. government survey of Soviet bloc economies estimates Russian aluminum output for 1952 at 225,000 metric tons.

New airport terminal buildings will be started in Minsk, Stalino, Adler, Frunze, Nikolaev, Tallinn, Alma-Ata and Chelyabinsk during this year as part of an ambitious airport construction program at high-traffic points.

Last year Russia completed terminal buildings at four stops—Kazan, Sverdlovsk, Krasnoyarsk and Khabarovsk—on the transcontinental route from Moscow to Vladivostok.

600F Oil Filter

Aircraft Porous Media, Inc., Glen Cove, N. Y., has been awarded an Air Materiel Command development contract for an airborne hydraulic oil filter designed to operate at 600F and meet MIL-F-5-5504A specs for 10-micron removal. Unit will employ Micro Metallic Corp.'s Rigimesh filter media.

APM also has set up a glass bead filter calibration service to evaluate filter performance, stated to be sensitive over the 5-80-micron range.

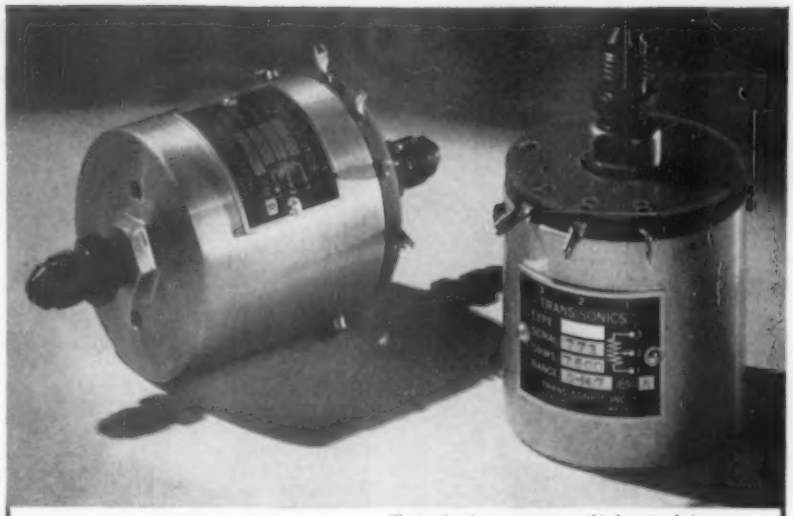

Illustration is approx. two-thirds actual size

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THE TRANS-SONICS® TYPE 75 PRESSURE-OPERATED POTENTIOMETER will operate satisfactorily while subjected to ±25 G vibration at any frequency up to 2000 cycles per second.

This is 2½ times the acceleration and 4 times the frequency range of Paragraph 4.7.1, MIL-E-5272A.

No vibration mounts or other trouble causing gadgets are employed to accomplish this. The resistance to shock and vibration is built in the instrument mechanism itself. For further information request technical data on Type 75 BARORESISTORS.

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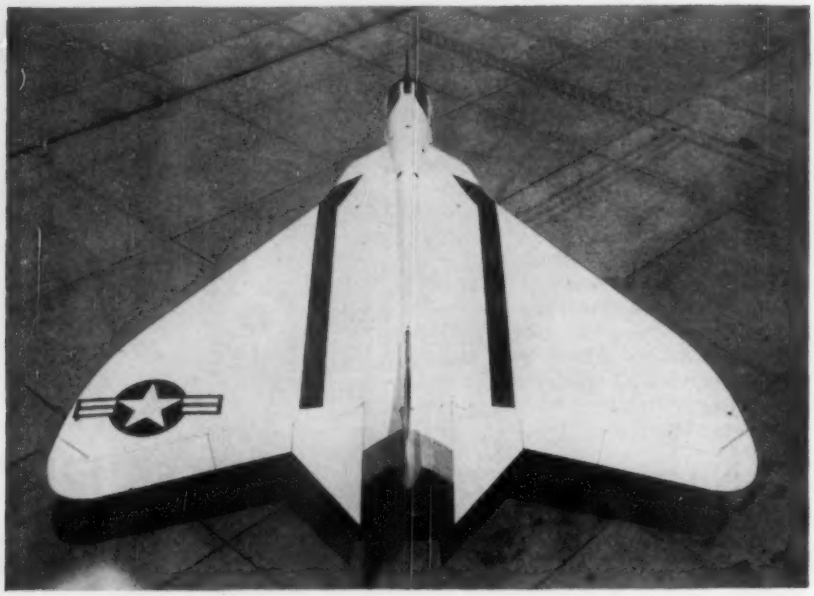
7 FOREST STREET, BEDFORD, MASS.

Outboard portions of the wing fold upward for carrier storage. Wingspan



F4D PLANFORM pays off in maneuverability at altitude, good landing characteristics.

Ten-Minute Killer Mission Guided F4D Skyray Design

By David A. Anderton

A ten-minute mission, flown at maximum power, is the major job of the Douglas F4D Skyray, about to go into service with U. S. Naval air units to provide top cover for carrier task forces.

Its primary mission is to kill enemy bombers making 500 knots at 40,000 ft., before they reach the drop point for an attack on the carrier or the area being protected.

Built into the developed delta layout of the Skyray is the capability to climb to 40,000 ft. in less than five minutes and to follow this rocketing performance with five minutes of combat at altitude and maximum power.

Coupled to this tough height-fight requirement is the impressive performance of the interceptor at low altitudes. Current holder of the 100-km. closed circuit course record at a blistering 728.110 mph., the Douglas fighter also holds the 3-km. speed record at 753.4 mph. Both records were set in low-speed passes near the 100-ft altitude mark, and both were set with the experimental airplane powered by a Westinghouse J40-WE-8 plus afterburner.

Production aircraft are equipped with the Pratt & Whitney J57-P-2 turbojet with afterburner. On the first flight of the first production airplane with this engine, Douglas testpilot Bob Rahn flew through Mach 1 in straight and level flight. On another flight, the plane went from a standing start to 10,000 ft. in 53 seconds.

Configuration

The planform of the F4D is its chief recognition feature and one reason for its performance. By using a highly swept, low-aspect-ratio geometry, Douglas aerodynamicists bought their best compromise: low drag for speed, low wing loading for altitude maneuverability and good stability and control qualities at the approach and landing speeds associated with carrier operations.

Gross wing area of the Skyray is 557 sq. ft. with an airplane gross weight near 20,000 lb. For normal operational conditions, the takeoff wing loading of the F4D is about 36 psf. At the start of combat, this loading will have dropped to somewhere around 34 psf.

Trailing edge controls are elevons and trimmers; leading edge slats are fitted, and there are four air brakes paired on upper and lower surfaces near the fuselage and wing trailing edge.

Douglas F4D is subject of a team effort by Senior Engineering Editors David A. Anderton and Irving Stone. Design study begins above; for production analysis, see p. 44.

Outboard portions of the wing fold upward for carrier storage. Wingspan of the unfolded surface is 33 ft. 6 in.

Vertical tail is a conventional swept surface with split rudders.

Fuselage is also conventional, with a little more down-angle over the nose than usual. This is because of the higher angle of attack on the airplane during approaches and when maneuvering at altitude.

Overall length is 45 ft. 8 in., and height is 13 ft.

Powerplant

Four separate types of engine have powered the F4D during its development since the first flight Jan. 23, 1951.

First two XF4D-1 prototypes mounted Allison J35-A-17 turbojets rated at 5,000-lb. thrust. The Allison engine was a temporary expedient until the first Westinghouse J40s were available.

First Westinghouse engine to go into the plane was the J40-WE-6, without an afterburner. This also was a temporary engine, intended to be a stopgap until the afterburning engine was available. The J40-WE-8 equipped with afterburner was later installed and powered a prototype to two speed records.

But some months before the records were set, the Navy had decided to switch from the J40 to the Pratt & Whitney J57 on production airplanes as a matter of necessity to meet delivery requirements. The J57 was expected to have greater growth potential and lower fuel consumption because it was a more advanced design than the J40.

First production planes were powered with the J57-P-2 with afterburner; it is certain that later models along the line have later marks of engine.

A ground turbine starter, built by AiResearch, can be carried as a store under the wing, balanced by a 300-gal. fuel tank on the other side.

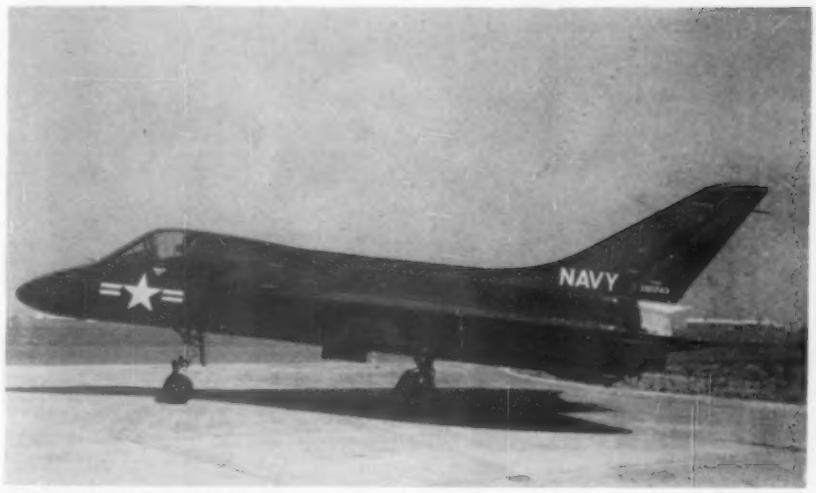
Armament

Basic punch of the Skyray is probably the standard Navy complement of four 20-mm. cannon. But seven pylons mounted under the wings and fuselage point up the extra amount of external armament stores that can be carried by this aircraft.

Among them as alternates to the standard armament, the F4D can tote any of the following:

- **Six rocket packages** each containing seven 2¾-in. rockets.
- **Four rocket packages** each containing nineteen 2¾-in. rockets.
- **Two 150-gal.** or two 300-gal. fuel tanks.
- **Bombs up to 2,000-pounders** on each of the two wing bomb racks.

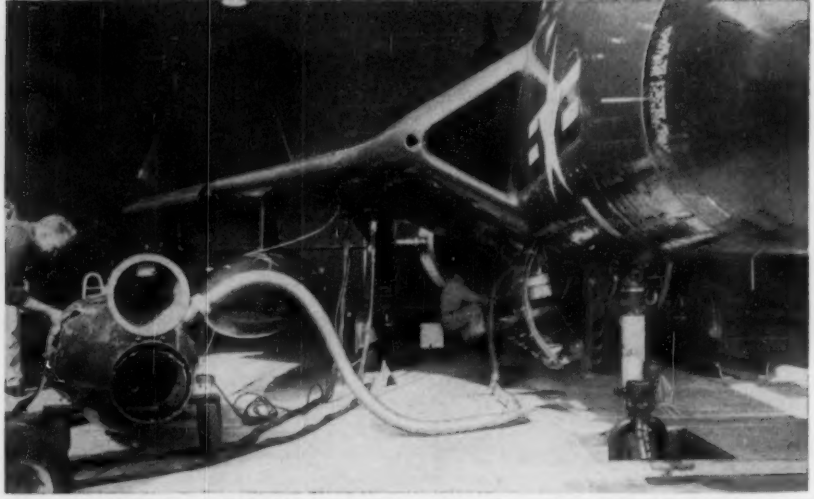
Current all-weather capability of the



HIGH ANGLE OF ATTACK accounts for larger than usual down-angle of F4D nose.

SKYRAY PYLONS can carry rocket packages to supplement standard 20-mm. cannon.

FOUR-POINT LANDING GEAR consists of normal tricycle gear and a tail wheel.



F4D-1 IN SILENCER BUILDING for engine run-up. Ground turbine starter at left may be carried on pylon under wing for airborne delivery to distant bases.

Douglas interceptor makes use of the Aero 13F fire-control system, incorporating APQ-50A radar and the Mk. 16 sighting system. Further development will integrate an automatic flight control system into the fire-control unit so that the airplane will track and fire automatically.

Systems

The F4D is one of the few airplanes with four-point landing gear. The normal tricycle gear is supplemented by a tail wheel, necessary for the high angle of attack operations peculiar to aircraft with low aspect ratios. But Douglas engineers were able to save the weight of the extra wheel through reductions in the length of the nose gear and main gears.

Two independent hydraulic systems handle the full-power controls of the F4D. Direct manual control is available if the engine stops or if both systems fail.

History

The Skyray, for all its advanced configuration, is eight years old. In 1947, Navy's Bureau of Aeronautics asked Douglas engineers under Ed Heinemann to investigate a delta-wing design as applied to an interceptor. After one year of study, the design team came up with the basic layout of the F4D which has been changed only slightly since.

These early studies showed that there was more than planform selection in developing a configuration. Model tests proved that there were three important parameters: sweepback angle, aspect ratio and thickness.

Final selection of the F4D wing geometry was made in 1948. Subsequent wind tunnel and flight tests have proven the characteristics of the layout to be all the Douglas engineers hoped they would.

Heinemann points out that the final proof of the rightness of the design depends on what the fleet operations show. Meantime, he cites three major conclusions to be drawn from the Skyray development:

• **Satisfactory stability and control** can be obtained with this layout and without the horizontal tail in high subsonic, transonic and supersonic speeds.

• **Drag advantages in these speed ranges** apparently come from the highly swept, low-aspect-ratio wings compared to more conventional arrangements.

• **Outstanding takeoff and landing characteristics,** coupled with superior high-altitude maneuverability, result from the low wing loading of this type of configuration.

Study's Objective: Improving TAC

Buffalo Bill is the project code name for a broad approach to the many problems of Tactical Air Command currently being sudied by the Cornell Aeronautical Laboratory.

The study aims at three objectives: improving the survivability, operational effectiveness and weapon effectiveness of the tactical air arm. The program was initiated by TAC in 1951 to improve its all-weather, round-the-clock operation in any part of the world.

Specific activities of Buffalo Bill:

• **Ground dispersal of tactical aircraft.** Studies made by CAL's aero-mechanics department showed the advantages of VTOL aircraft, particularly those using a new engine concept giving increased takeoff thrust and reduced fuel consumption under cruise conditions. This may refer to the bypass engine.

• **Development of a simple and accurate navigational system** for bombing and reconnaissance, with extended range and capable of operating at low level beyond the radar horizon.

• **Operational studies for improved combat efficiency.** Among the subjects in this study were terrain avoidance during low-altitude navigation, physiological effects of turbulence on pilots, evaluation of radar displays, aerodynamic limits of low-altitude flight, advanced radar search techniques and electronic countermeasures.

• **Improvements in search and fire-control systems** to make them capable of finding, identifying and destroying targets in all kinds of weather.

• **Flight research on automatic stabilization** of aircraft to improve their characteristics as gunnery and bombing platforms in ground and air attack.

• **Evaluation studies of new offensive weapons** for tactical aircraft in areas of search, fire control and ordnance equipment. This phase should give comparisons of various systems as well as point the way to new research.

Separate from the TAC study, the laboratory continues its activities in guided missiles.

Long-range interceptors and missile vulnerability have been studied as part of a task for Continental Air Defense, and a broad study of Naval task force defense has been completed during the past year.

THRUST & DRAG

"Do we really appreciate the tremendous dependence of our nation on the scientists and engineers? Do we fully realize that one man with an idea on how to guide an intercontinental missile to its target with accuracy is worth thousands of men in uniform? . . .

"As the nations of the world come to depend more and more on scientific progress for their social, political, economic and military strength, the role of a relatively small number of men increases. . . . And there are always too few people with trained minds to carry us forward. We are too quick to oppose the idea that one man can make a more significant contribution than another.

"The concept that all men are created equal has dominated our thinking. To be sure, they are all equal before the law. But they are not all alike. Men cannot be treated like so many cars coming off the assembly line. The success or failure of each man in making his contribution to the world is a matter of emphasizing certain talents, or being different each in his own way."

—Rep. Carl Hinshaw (D., Calif.), Chairman of the Research and Development Committee of the Joint Committee on Atomic Energy.

PRODUCTION

tic 'tac' toe!

In the event of surprise attack, today's new and more powerful USAF Tactical Air Command can now carry war to the enemy anywhere in the world—around the clock and in any weather.

Here at a glance are some of the elements that might be used in such an attack and which are contributing to Tac Air's new mobility and striking power.

In modern warfare, major fixed bases are certain to become targets for initial enemy action. The Martin zero-length launcher makes possible swift mobility and advance-area operation of the TM-61 Matador tactical missile and—if need be—of piloted jet fighters.

In addition, new versions of U.S. Air Force's B-57 bomber, a major tactical weapon, are now being developed for service.

And for tomorrow's Tactical Air Command arsenal, new and more powerful Martin weapons systems are on the way.

MARTIN

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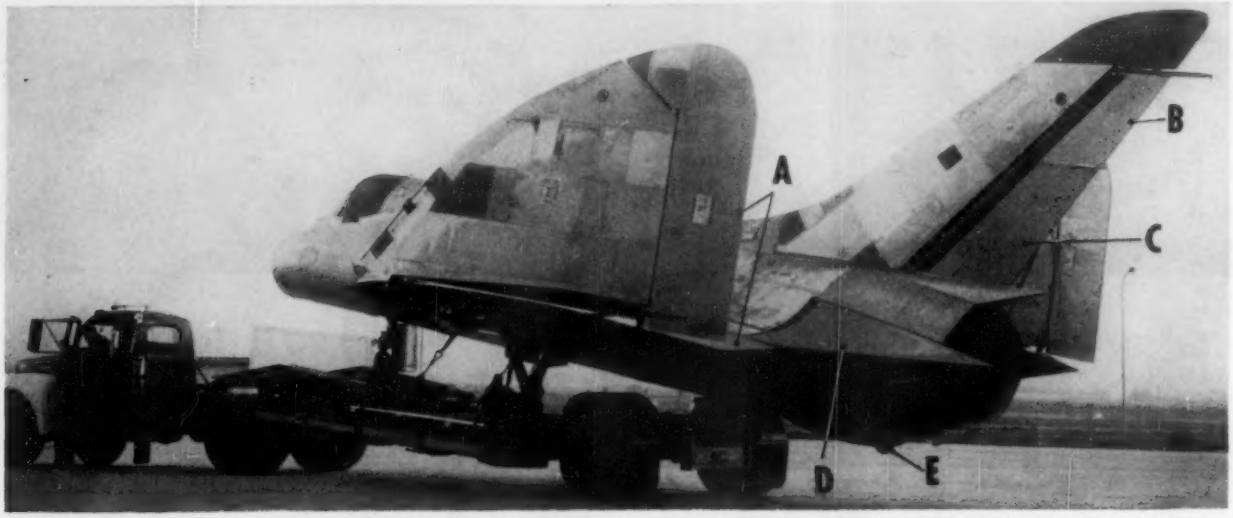
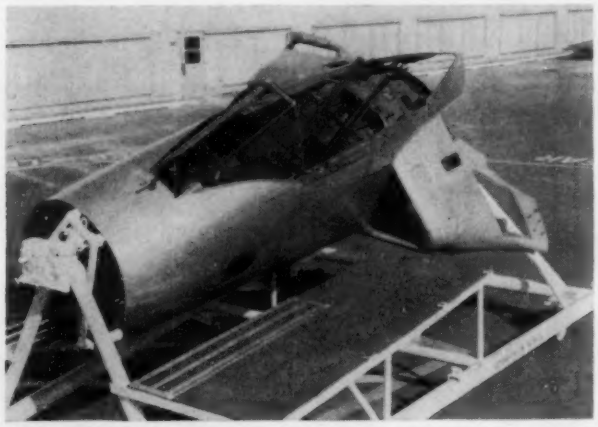
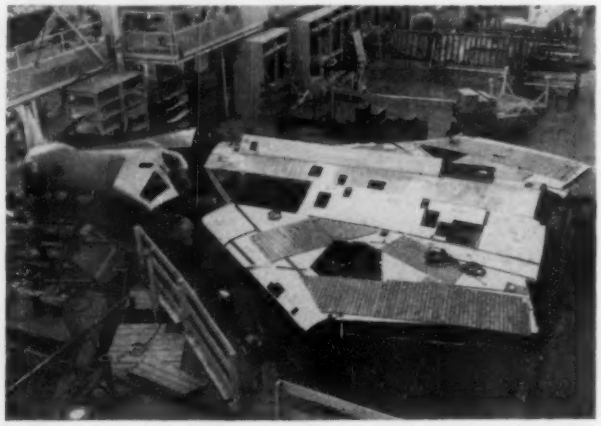


SKYRAY RIDES TRUCK from plant to Los Angeles International Airport for installation of engine, radar checkout and preparation for flight. Details: a) elevons, b) upper rudder, c) lower rudder, d) pitch trimmer, e) tail wheel.



NEW NOSE SECTION incorporates air scoop and main frame (rear). Jig may be locked in position to facilitate installations.



SEW-UP STATION for mating nose section, inner wings and fuselage box. Fairing between fuselage and wings covers fuel area.

F4D Meets Challenge of Engine Change

By Irving Stone

Torrance, Calif.—Reengineering the Douglas F4D Skyray to take the P&WA J57 engine was a big job. Douglas designers and production men teamed for a fast result which saw the first J57-powered Skyray come off the line and fly just 13 months after approval was given in April 1953, to switch from the Westinghouse J40. Delivery of first production plane was made June 5, 1954.

In the switch, about 80% of the structure, installation and specification items underwent engineering change. Production proceeded along with change making, so that the plane was well along the line while some of the fringe items —doors, scoops, etc.—were still in the process of being designed.

This close liaison between engineering and manufacturing has led to a well-filled production line.

Major Assemblies

Structure of the F4D-1 breaks down into 14 assemblies: Center wing, outer wing, upper rudder, lower rudder, vertical stabilizer, inner and outer elevons, pitch trimmer (at trailing edge-fuselage junction), nose radome, fuselage nose, scoops and ducts, cockpit enclosure, dorsal panel and fin (actually top of fuselage or engine bay), fuselage bottom (engine access door) and tailcone.

All these units are interchangeable, ship-to-ship. This degree of interchangeability became effective with the 12th airplane.

New fuselage-nose incorporates the air scoop and the main frame, which ties into the front spar. Forward of the main frame and aft of the cockpit is the radio compartment. Skin fairing on the aft side of the nose encloses the battery (starboard) and autopilot (port).

While the fuselage nose is being built and complete installations made in it, the inner wings (stubs) and the dorsal panel (upper fuselage portion) also are being assembled. These four major components are fed into an adjacent sew-up jig for the joining operation.

Movable Line

Taken out of the sew-up jig, this assembled unit proceeds along a mov-

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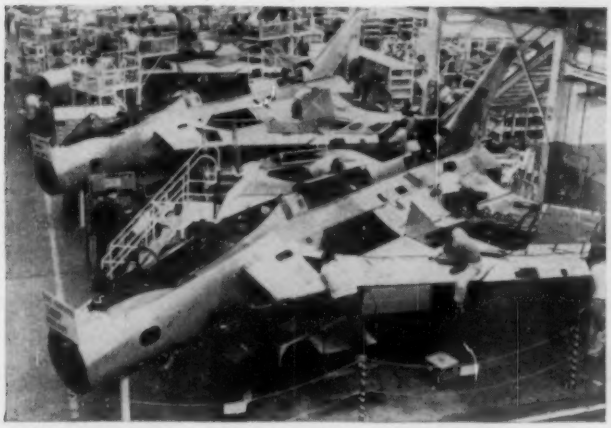
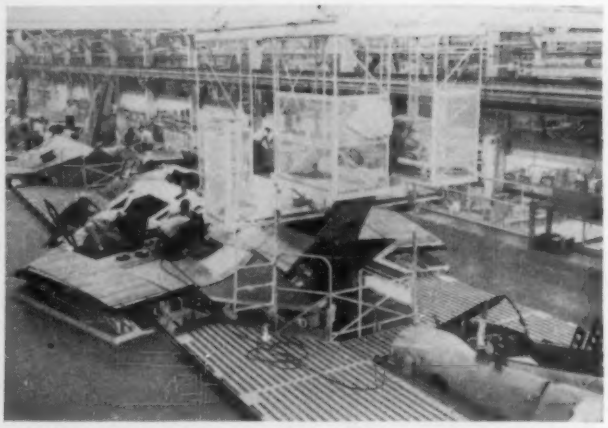
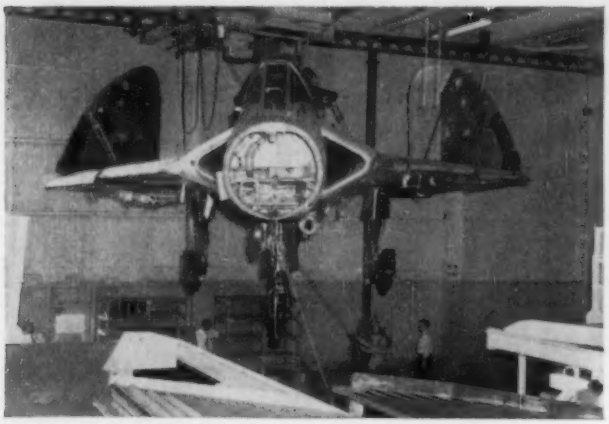
Along the Douglas F4D Production Line . . .



MATING LINE. Nose, stub wing and fuselage box have been joined.



DOUBLE DECK final line, with mobile work cage astride F4D.



F4D LINE is arranged in two aisles. Here the airframe is turned to go down the line for final work, except for painting.

ANOTHER VIEW of double-deck final assembly line. Plane is mounted on elevated platform by rollers attached to stores racks.

able line for incorporation of wing installations—wiring, tubing, gun parts, control brackets, cables, torque tubes, hydraulic units, elevon bellcranks, etc.

On this movable line, all pre-installed wiring in the nose is connected to counterparts in wing by permanent splices.

From this line, the structure moves to the mating jig where the fixed tailcone and vertical stabilizer are hooked up.

At this point, installations have been substantially completed in the nose, stub wings, vertical stabilizer and dorsal panel (engine bay). So the main assembly line (1,400 ft. long, with 34 stations) is used to install major components such as outer wings (complete with slats, elevons and wingtips), upper and lower rudders, inner elevons on stub wings, tank units at inner portion of the stub wings, main landing gear, nose gear.

This arrangement permits early start of numerous operations and checkout procedures on the main assembly line. Plane is completed on this main assembly line, except for painting.

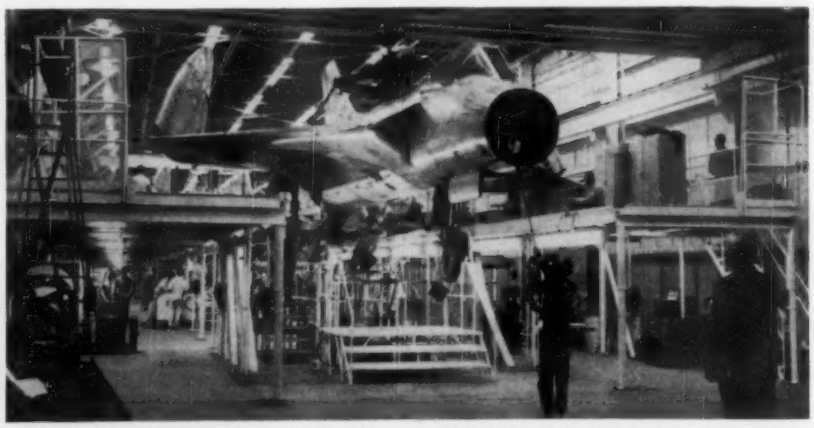
On the main line, the airframe is supported on an elevated fixed platform by rollers attached to each wing stub at the middle external stores rack, the structure thus becoming its own fixture. The immediate platform sur-

Feeding the Factory

Special food wagons serving the production personnel on the F4D line save time and are convenient.

These vehicles, carrying hot food, are brought to each general working area, where there is a special lunch section fitted with tables and chairs.

Between lunch periods these sections are used as conference rooms.



SKYRAY IS LOWERED from double-deck assembly line. The plane is now ready for trucking to Los Angeles International Airport for engine and radar installation.

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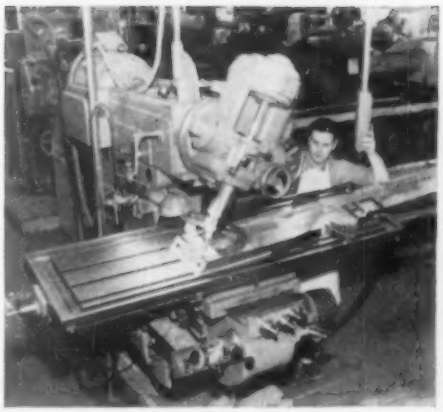
helps give the Sabre its edge

Famed for its combat superiority with the United Nations in the skies over Korea, the Sabre Jet is now being supplied to other NATO countries.

Twin Coach Aircraft Division was selected as a subcontractor for large and intricate machinings for the F-86 as well as for North American Aviation's other high-performance aircraft, the F-100 and FJ4.

These important assignments are typical of the way in which leading airframe manufacturers rely on Twin Coach as a source of major airframe assemblies.

If you have an assembly you're considering subcontracting, call Twin Coach for consultation. Our *aircraft* experience . . . our 23½ acres of plant and facilities are at your disposal.



Twin Coach Aircraft Division plants turn out wing spars, main wing panels, flaps, complete center sections with plumbing and electrical wiring, and other large assemblies.

OTHER DIVISIONS OF TWIN COACH COMPANY MAKE: *Fageol Van and Pony Express Trucks, Fageol Gasoline and Propane Engines, Fageol-Leyland Diesel Engines.*

TWIN COACH COMPANY

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Decentralized Fabrication

Douglas is using a decentralization scheme for installation activities in F4D production.

Each installation department fabricates as well as installs its own electrical wiring bundles, hydraulic tubing, certain small sheet metal parts, etc., to eliminate transportation, paper work, and to easily accommodate engineering changes affecting this type of equipment.

This procedure has been found to work out much better than having separate, large fabrication areas producing equipment for installation departments.

rounding the airframe moves with the latter along the fixed platform.

For the paint job, a special building is under construction, at the end of the assembly line. In a procedure which is expected to reduce cost substantially, the plane will be rotated to a vertical position and be supported by piston rods extending through the afterburner to the engine mount. An elevator platform will give access to both sides of plane for the painting operation.

From the paint shop, the plane is trucked to hangar operations—10 mi. away, at Los Angeles International Airport—for the installation of the powerplant, radar checkout and preparation for flight.

Trucking time, about 25 min., is done between 2 and 5 a. m. The plane stands on the truck in normal attitude, comes off on its own rubber.

Silencer chambers at the airport permit engine run-up even with afterburner.

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

General Paint Corp., 2627 Army St., P. O. Box 3474, Rincon Annex, San Francisco, paint, 25,500 gal., $52,785.

General Electric Co., 1405 Locust St., Philadelphia 2, kits, 5,683 ea., $656,671.

Glenn L. Martin Co., Baltimore 3, hatch assys., panel assys., $99,486.

Grimes Mfg. Co., 515 N. Russell St., Urbana, Ohio, spare parts, $37,141.

Grumman Aircraft Engineering Corp., Bethpage, Long Island, puller belts and jury struts, $32,640.

Parker Aircraft Co., Los Angeles, valves, $40,363.

Permutit Co., 330 W. 42nd St., New York 36, kits, 6,800 ea., $76,258.

Purolator Products, Inc., 970 New Brunswick Ave., Rahway, N. J., filter elements, 44,989 ea., $42,290.

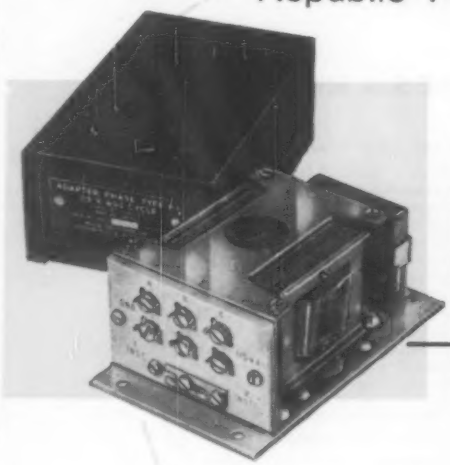
Radio Corp. of America, RCA Div., 19th and Federal St., Camden, N. J., transmission assys., 50 ea., $41,283.

Scintilla Div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., distributors and magneto assys., $26,089; distributors, $544,739.

Turco Products, Inc., 95 Fairmount Ave., Philadelphia 23, compound, 7,900 gal., $25,-101; paint remover, 151,243 gal., $179,540; paint remover, 145,942 gal., $172,808.

A GREAT TEAM!

Republic F-84 Thunderstreak



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THUNDERSTREAK JETS GET PLACES FAST — speeds of over 650 MPH at altitudes of over 45,000 ft. Under these extreme conditions the constant accuracy of every flight instrument is VITAL! Instrument failure or lapse could mean a lost battle or a lost aircraft. This is why Republic and other leading aircraft manufacturers cut excess weight and cost by installing the New White Power and Phase Converter... single phase power is precisely and dependably converted to the 3-phase delta connected power needed to operate all types of instruments.

The White Industries converter boosts your payloads and slashes your costs by —

- **Saving at least 13 lbs. in each installation.**
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- **Offering lowest market price per unit.**

Constant high precision plus immediate delivery from stock at new low prices (according to quantities) are the important results you gain from the sweeping engineering advances and techniques innovated by White Industries.

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USAF Contracts

Following is a list of recent contracts announced by the United States Air Force.

B. F. Goodrich Co., Dayton, wheel assy. for H-37A aircraft, 200 ea., brake assy. for H-37A aircraft, 200 ea., 70 ea., $81,189.

Bell and Howell Co., Chicago, shuttle, 2,500 ea., plate assy., 800 ea., $34,779; phase III, motion picture camera, 107 ea., $238,375.

Red Bank Div., Bendix Aviation Corp., Eatontown, N. J., generators, aircraft, 224 ea., 243 ea., $843,699.

Continental Aviation and Engineering Corp., Detroit, engines, YJ69-T9, 2 ea., engines, J69-T19, $164,000.

Convair Div., General Dynamics Corp., San Diego 12, Calif., spares on VC-131D airplanes, $894,050.

Convair Div., General Dynamics Corp., Fort Worth, Tex., rehabilitation and improvement of government-owned plant 4, $730,000.

General Electric Co., AGTD, Cincinnati 15, additional S/P (RCAF)-MDAP, $100,000.

General Electric Co., West Lynn, Mass., generators, aircraft engine-driven, 240 ea., 189 ea., $288,854.

General Motors Corp., A.C. Spark Plug Div., Flint, Mich., spare components and spare parts, training parts, $370,000.

General Tire and Rubber Co., Akron, wheel assemblies, 566 ea., $48,839.

Hartman Electrical Mfg. Co., Mansfield, Ohio, over-voltage relays, $38,163.

Leland Electric Co., Dayton, motor-generators, spare parts and data, $902,401.

Link Aviation, Inc., Binghamton, N. Y., low-frequency radio range attachment C-11B, flying instrument trainer, 115 ea., $218,800.

Lundy Mfg. Corp., Long Island City, N. Y., power units, 89 ea., $32,138.

Morse Instrument Co., Hudson, Ohio, dryers, 10 ea., $57,689.

Northrop Aircraft, Inc., Hawthorne, Calif., reeling machines, cable, pneumatic, internal, 30 ea., $150,000.

Ruthrauff and Ryan, Inc., New York 17, production of not less than 300 nor more than 900 recruiting booth displays, $80,000; purchase of classified adv. space in Group 3 and 4 labor areas, $73,621.

St. Clair Rubber Co., Marysville, Mich., SNR-tank, collapsible, 152 ea., $90,440.

Stratford Pen Corp., New York, components of AN/AIC-8, spare parts, $72,037.

Sylvania Electric Products, Inc., Electronic Systems Div., Buffalo 7, spare parts for AN/ARC-3 VHF radio set, $28,161.

Sikorsky Aircraft Div., United Aircraft Corp., Bridgeport, Conn., depot overhaul spare parts, $1,995,139.

Wells-Gardner & Co., Chicago 39, radio receivers, 50 ea., 60 ea., $108,962.

Bendix Radio Div., Bendix Aviation Corp., Towson 4, Md., antenna reflectors, 4 ea., oscilloscopes, 7 ea., $83,000.

Bogart Mfg. Corp., 315 Seigel St., Brooklyn 6, oscillators, 152 ea., $145,535.

Cook Electric Co., 2700 Southport Ave., Chicago 14, NSL frames, 68 ea., $90,622.

Eastman Kodak Co., 343 State St., Rochester, N. Y., film, 856,800 ft., film, 16,619 rl., $504,806; film, 3,290 rl., $35,606.

General Aniline and Film Corp., Ansco Div., Binghamton, N. Y., film, 1,760 pkg., $99,911; film, 600,000 ft., film, 1,628 pkg., $43,655.

General Cable Corp., Railroad St., Rome, N. Y., wire, 546,500 ft., $109,238; cable, 20,000 ft., cable, 35,000 ft., $120,225.

Haloid Co., 2-20 Haloid St., Rochester, N. Y., paper, 1,268., paper, 2,644 rl., $69,054.

Insuline Corp. of America, 186 Granite St., Manchester, N. H., switchboards, patching communication, 146 ea., $91,666.

Kellogg Switchboard and Supply Co., Div. of International Telephone and Telegraph, 6650 S. Cicero Ave., Chicago 38, positional unit, 1 ea., line frames, 5 ea., selector relay frames, 2 ea., $159,433.

Lavoie Laboratories, Inc., Matawan, Freehold Road, Morganville, N. J., cabinets, equipment containers, 14 ea., bridge modu-

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In strategic locations across the free world our sentinels of security scan the skies . . . stand ready day and night to protect our frontiers and cities. Your confidence is assured in electronic devices engineered by Stewart-Warner Electric imagination and produced with Stewart-Warner Electric precision.

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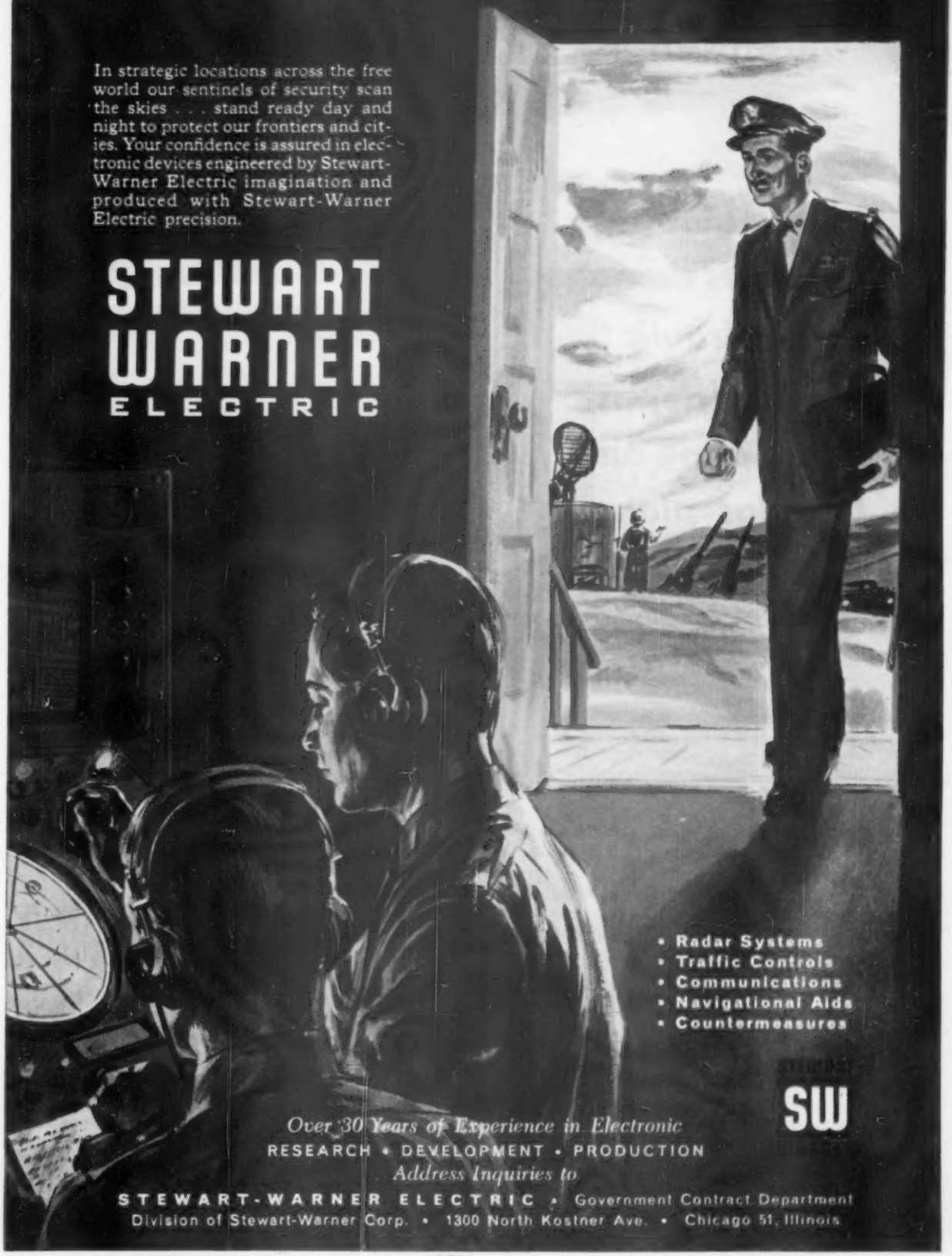

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lation eliminators, 28 ea., phasers, 13 ea., **Corp.**, Wood-Ridge, N. J., maintenance tools control panel, 221 ea., $393,360

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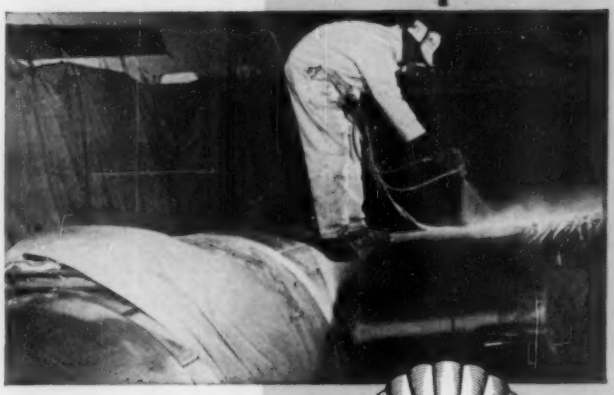
New paint prevents damage by hydraulic fluid, exhaust deposits, weathering on Douglas planes

Above right

Douglas DC-7, new record-breaking luxury airliner.



Applying Epon resin-based "Cat-A-Lac" to exterior wing section of a Douglas DC-7. Cat-A-Lac is manufactured by Finch Paint and Chemical Co., Torrance, California.

FIRE-RESISTANT hydraulic fluid, widely adopted by the airlines, attacks ordinary paint. Faced with this problem, materials experts of Douglas Aircraft Company began a search for a protective coating that would stand up to synthetic hydraulic fluid, as well as wind and rain, erosion at air speeds of 300-400 mph, and corrosive exhaust deposits.

In several years of investigation, more than 300 formulations were tested. *But only "Cat-A-Lac" formulated from Epon resins,* applied in exhaust path areas, was *100% intact after more than 1000 hours in actual airline service.*

Because of the unusual durability of Epon resin-based coatings, they have been adopted by Douglas and leading airline operators for plane areas exposed to hot exhaust gases, gasoline, hydraulic fluid and cleaning solvents.

• • •

If you want a paint that lasts longer, one that has excellent adhesion, resistance to abrasion and impact, ability to withstand extremes of heat, humidity and corrosive atmospheres . . . ask for *Epon resin coatings.* Call on our sales offices for names of suppliers. Write for the full Epon coatings story in the new brochure, "Planning to Paint a Pyramid?"

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EPON resins are the epoxy polymers made exclusively by Shell Chemical Corporation.

lation eliminators, 28 ea., phasers, 13 ea., $51,246.

Parkchester Machine Corp., 204 Lafayette St., New York, amplifiers, 110 ea., $44,326.

Sterling Precision Inst. Corp., 34-17 Lawrence St., Flushing 54, N. Y., antennas, 14 ea., antenna sections, 14 ea., $38,710.

Barber-Colman Co., Rockford, Ill., actuators, $56,172.

Parker Appliance Co., Cleveland, packing, O rings, 128,250 ea., 36,200 ea., 41,350 ea., 21,400 ea., 65,000 ea., 94,200 ea., 7,900 ea., 82,650 ea., 37,300 ea., 37,400 ea., 700 ea., 800 ea., 100 ea., 700 ea., 1,600 ea., $18,863; seal, O ring, fuel resistant, 1,800,550 ea., $50,023.

Roman and Kunz, Inc., Marshall, Mich., trailers, with necessary parts to attach tanks to trailers, for use with 50-gal. liquid oxygen tanks, 70 ea., $43,288.

Aero Design & Engineering Co., Bethany, Okla., aircraft and auxiliary equipment, 1 ea., $74,868.

Aerojet-General Corp., Azusa, Calif., boosters, Rato rockets, 13 ea., $72,378.

Aerosonic Instrument Corp., Cincinnati, rate of climb indicators, 781 ea., $67,766.

Aircraftsmen Co., Gardena, Calif., aircraft bomb racks, 1,882 ea., 763 ea., $125,635.

Avien, Inc., Woodside, N. Y., temperature indicators, 262 ea., $36,770.

Bell & Howell Co., Chicago, gun cameras, w/lens, 794 ea., 449 ea., 254 ea., $573,985.

Red Bank Div., Bendix Aviation Corp., Eatontown, N. J., generators, 10 ea., modification kits, data, 2,090 ea., $66,249.

Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., accelerometers, aircraft, 1,625 ea., $132,600.

Canadian Commercial Corp., Washington, D. C., AF Depot overhaul spare parts for Army L-20A airplanes, $230,955.

Collins Radio Co., Cedar Rapids, Iowa, spare parts, training parts, tools and equipment, $625,164.

Continental Aviation and Engrg. Corp., Detroit, YJ69-T17 engines, special tools and ground handling equipment, 12 ea., $263,327.

Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J., maintenance tools and test equipment for R3350-34 engines, $64,526; maintenance and overhaul tools, $200,000.

Douglas Aircraft Co., Inc., Tulsa, Okla., facilities for the cycle maintenance of B-47 aircraft, $350,000.

Eastern Airlines, Inc., New York, fabricate parts and assys., $35,450.

General Electric Co., Schenectady, N. Y., indicators, tachometer, 5,258 ea., $336,512; generators, a.c. aircraft, engine-driven, $101,409.

Goodyear Tire and Rubber Co., Akron 16, brake assys. for F-94C aircraft, 720 ea., wheel assys. for F-94C aircraft, $299,039.

Guardian Electric Mfg. Co., Chicago 12, spare parts, switch, control stick, 4,525 ea., $217,435.

James Mfg. Co., Ft. Atkinson, Wis., laboratory darkrooms, 31 ea., $70,172.

Lambert Engineering Co., St. Louis, test sets for type A-5 photoflash ejectors, 19 ea., for type A-6, 202 ea., test sets for master control panel, 221 ea., $392,360.

Leland Electric Co., Dayton, Ohio, 3-phase inverters, $319,068.

Lewis Engineering Co., Naugatuck, Conn., temperature indicators, 936 ea., 174 ea., $33,133.

Olin Mathieson Chemical Corp., East Alton, Ill., cartridges, starter, aircraft engine, 28,581 ea., $540,752.

Pacific Optical Corp., Los Angeles, lenses plastic scanning, 472 ea., $27,376.

Radio Corp. of America, Engineering Products Div., Camden, N. J., amplifiers and data, $251,325.

Radio Corp. of America, Los Angeles 6, components of AN/APN-70, spare parts, $740,650.

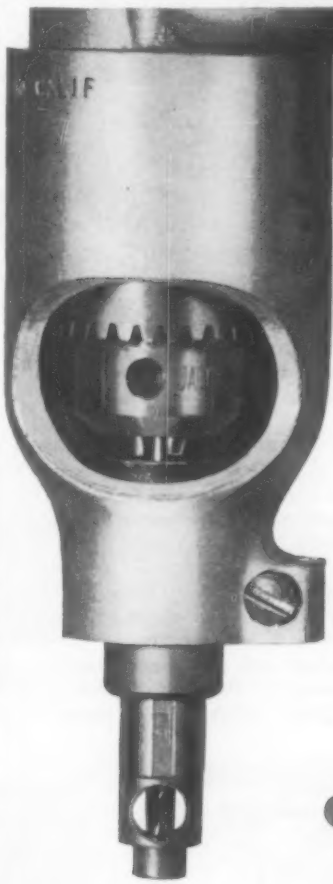
Republic Aviation Corp., Farmingdale, L. I., N. Y., special tools and GHE for 177 B-57 airplanes, $290,100; F-84F mobile training units, $143,712.

Seaboard Electric Co., New York, fund for special tools and test equipment, $20,000.

Sperry Gyroscope Co. Div., Sperry Corp.,

Template Checks Fasteners

Template tote board simulates aircraft assembly bolt holes and marks correct size and type of each fastener, insuring that worker gets full quota of necessary items from stock bins. Idea is used at Glenn L. Martin Co., Baltimore, Md.



Standard replaceable tips available in assorted sizes for both straight or tapered hole templets.

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No More Ruined Templets; Broken Drills!

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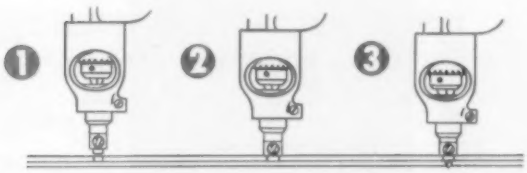
Here's a tool of advanced design that speeds production, eliminates "off holes," costly work spoilage, and drill breakage.

Zephyr Collapsible Drill Guides with their interchangeable tips protectively recess the drill while accurately locating on the work. No more slant approaches, chewed templets, scarred surfaces. Chips disperse through wide ports.



Guide protects drill tip during approach.

Guide seated. Drill automatically centered.

Guide collapsed. Chips dispersed through ports.

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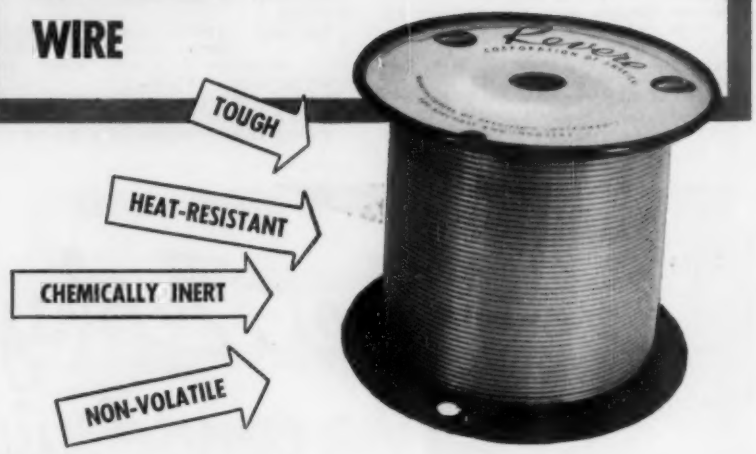

Because of its extreme toughness, high heat resistance, and chemical inertness, Revcothene insulated wire is widely recommended for hermetically sealed equipment . . . for devices operating with small gauge wire at high temperatures . . . and for conditions where corrosion is a problem.

Revcothene is silver-plated copper wire with an extruded coating of monochlorotrifluoroethylene. Even at 150° C. (302° F.) the insulation is inert . . . with no volatile lacquers or plasticizers to ruin contacts. Revcothene withstands abrasion and flexing, and resists such corrosives as ozone, acids, alkalis and petroleum products.

Available in eight standard sizes from 28 to 10 gauge . . . in 15 colors. Flexible strandings, copper or silver braid shielding, heavy wall insulation and jacketing can also be furnished. Multiple-conductor cables are also available.

Revcothene is only one of many insulated wire and thermocouple wire products made to exacting specifications by Revere Corporation of America. Technical design assistance gladly offered. Write today.

TYPICAL SPECIFICATIONS — 22-Gauge Revcothene Wire

Spark Test Voltage	7500
Insulation Resistance	1000 megohms/1000'
Operating Temperatures:	
Flexing Application	—40° C. to 135° C.
Non-Flexing Application	—65° C. to 150° C.
Flammability	Does not support combustion
Operating Voltage	1000 volts
Water Absorption	0.00
Effect of Acids & Alkalis	Generally unaffected
Cold Flow (Compressive Strength)	32,000 PSI
Abrasion Resistance (MIL-T-5438)	Passes 36"-400 grit aluminum oxide with 0.3 pound weight

* Revere's tradename for monochlorotrifluoroethylene

Revere CORPORATION OF AMERICA 2

WALLINGFORD, CONNECTICUT A subsidiary of Neptune Meter Company

Great Neck, L. I., N. Y., synchro generator selector switch box assembly, $179,475.

Stewart-Warner Corp., Stewart-Warner Electric Div., Chicago, radio sets, $445,957.

Webster Chicago Corp., Government Div., Chicago 51, dispenser sets, chaff, 872 ea., 448 ea., 572 ea., $975,008.

Westinghouse Air Brake Co., Union Switch and Signal Div., Swissvale, Pa., flight simulators, spare parts, 6 ea., $40,000.

Westinghouse Electric Corp., Lima, Ohio, generators, alternating current, 445 ea., regulators, voltage, 259 ea., $396,109.

Viewlex, Inc., Long Island City 1, N. Y., projectors, 1,008 ea., $140,515.

Curtiss-Wright Corp., Wood-Ridge, N. J., R3350-26WB engines; R3350-32W engines; R3350-34 engines; $21,769.

Flying Tiger Line, Inc., Burbank, Calif., air transportation cargo services for the movement of engines and/or cargo to the European area, $114,721.

Friden Calculating Machine Co., San Leandro, Calif., B-6A driftmeters, spare parts, special tools, 45 ea., $100,250.

AiResearch Mfg. Co., Los Angeles, actuators, linear, 167 ea., $30,658.

Convair Div., San Diego, Calif., special test equipment, $66,399.

General Electric Co., West Lynn, Mass., transmitters, 859 ea., $483,402.

Allison Div., General Motors Corp., Indianapolis 6, engine spare parts, $50,000.

Glenn L. Martin Co., Baltimore 3, modification of RB-57A aircraft to RB-57A-1 "heart throb," $750,000.

Kling Film Enterprises, Chicago 11, production of motion picture project, 1 ea., $16,399.

Standard Coil Products Div., Kollsman Instrument Corp., Elmhurst, N. Y., airspeed indicators, 804 ea., $257,207.

Lear, Inc., Grand Rapids 2, actuator assys., shaft assys. and drive assys., $62,-284.

Marmon-Herrington Co., Inc., Indianapolis 7, crash fire trucks, publications and reports, 25 ea., $800,000.

Massillon-Cleveland-Akron Sign Co., Massillon, Ohio, non-radar reflector tow target, 600 ea., $750,056; radar reflective tow target, 3,833 ea.

Mast Development Co., Davenport, Iowa, test set, radar recording camera, 114 ea., $162,527.

Minneapolis-Honeywell Regulator Co., Minneapolis, components of type E-11 automatic pilot for RCAF, $78,140.

Olympic Radio and Television, Inc., Long Island City 1, components of AN/APN-76, $557,743.

Overseas National Airways, Inc., North Hollywood, air transportation, cargo services, transporting engines and/or cargo in the Pacific area, $194,914.

Auburn Research Foundation, Auburn, Ala., collection of data on marginal manpower groups, $50,360.

Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., technical evaluation of the Intavex (Dudenhausen) two-axis automatic pilot, $66,851.

University of Chicago, 5801 Ellis Ave., Chicago 37, continuation of research on cosmic radiation and elementary particles, $82,225.

John Hopkins University, Baltimore 2, reports on "Pulmonary Diffusing Capacity and its Regulation to Ventilation and Circulation in the Lungs," $28,500; "Investigation of the Internal Ballisto-Cardiogram," $49,500.

University of Texas, Austin, development of test items for use with airman populations for selection and classification, $47,-866.

Van Valkenburgh, Nooger & Neville, Inc., 15 Maiden Lane, New York 7, development and reproduction of 200 sets of K-system trouble-shooting trainer tester, $33,876.

Phillips Petroleum Co., McGregor, Tex., construction of test cell, $43,000.

Radiant Mfg. Co., Chicago 8, screens, projection, 1,759 ea., $39,401.

Radio Corp of America, Engineering Div., Camden, N. J., training parts for AMP-84 radar set, $25,000; adapters, 11,000 ea., $200,000.

Ford Instrument Co. Div., Sperry Corp., Long Island City, computer sets, $13,922.

Standard Oil Co., Whiting, Ind., construction of industrial facilities for the development of solid rocket, $92,000.

PRODUCTION ... BRIEFING

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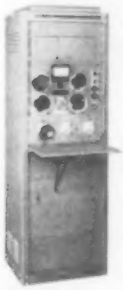
WHEN YOU THINK OF PRECISION RATE OF MOTION EQUIPMENT

THINK OF IDEAL

Model 10-14-30
Barometer, automatic indicating range 0 to 30"

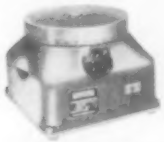


Model 18-33-4
Tachometer Tester

Model 11-11-33
Manometer, airspeed 2 column, 33"

Micro Reader Unit
Accessory for the Ideal Manometer line

Model 14-11-31
Roll-Pitch-Yaw Table



Model 12-11-21
Rate-Turn Table

In the field of precision pressure instruments, Ideal barometers, manometers, instrument test chambers and accessories offer a new approach to the problem of measuring absolute and differential pressures. Ideal provides standard scales on instruments designed for universal use and custom engraved scales on instruments engineered for a specific location.

Ideal manufactures an extensive line of test equipment such as rate-rate tables, compound turn and oscillating tables, roll-pitch-yaw tables and tachometer testers. In addition, Ideal has exceptional facilities for designing, engineering and manufacturing special test equipment in the aircraft and pressure testing fields.

Ideal also manufactures a line of sensitive needle valves that are widely used in laboratories, production facilities and test equipment to provide a sensitive adjustment and precise control of small flows in the handling of liquids or gases. Write or wire today for literature on the type of equipment in which you may be interested.

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3913 Evans Avenue, Cheyenne, Wyoming • 12909 S. Cerise Avenue, Hawthorne, California

PRODUCTION BRIEFING

▶ **Precision Castparts Co.**, Portland, Ore., has moved into a 48,000-sq. ft. plant which more than doubles its present investment casting and shell molding facilities.

▶ **Special thread cutter** makes 11½-in.-pitch pipe threads and averages over 1,000 linear feet of threads between grinds, for a total of 30,000 ft. during the cutter's life. Cutter is employed on a planetary thread miller in which the work is held stationary and the cutter is cycled automatically inside. Anti-backlash feature is said to extend tool life and permit climb milling. Cemented carbides are employed. Device was developed by screw machine unit of General Electric Co., Pittsfield, Mass.

▶ **Electrofilm, Inc.**, N. Hollywood, Calif., has obtained U. S. patents on its solid film lubrication process, stated to operate in temperature range of −100F to +750F.

▶ **Pastor Construction Co.**, Hillside, N. J., has received a $41,250 contract from Port of New York Authority to build a postoffice in Newark Airport's airmail and express building. PNYA also has granted a 10-year lease to Gulf Oil Corp. for a 31,000-sq. ft. gasoline service site at the field, at an annual rental of about $21,400.

▶ **Computing Devices of Canada, Ltd.**, Ottawa, has been appointed exclusive Canadian agent for Texas Instruments, Inc., makers of transistors, semi-conductors and specialized components.

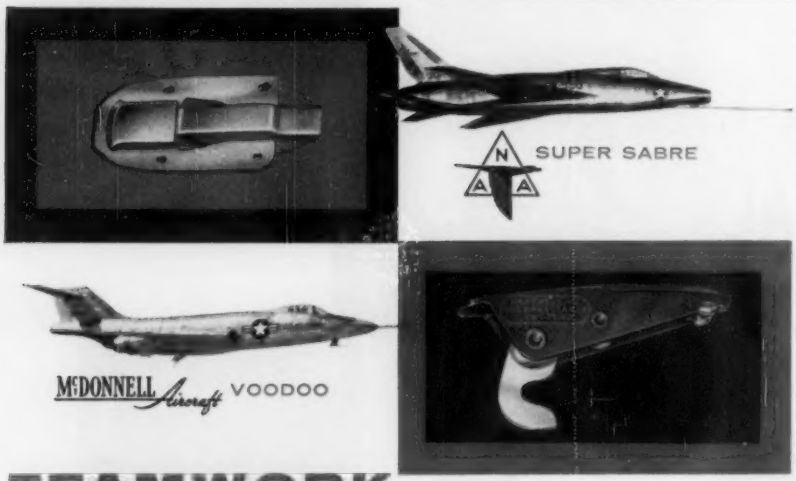
▶ **International Staple & Machine Co.**, Herrin, Ill., has been appointed national distributor for Vac-U-Lift materials handling equipment by Blakeslee Manufacturing Co., Salem, Ill.

▶ **Rex Corp.**, West Acton, Mass., has completed new production facilities for production of Resin-Glas, a cast acrylic sheet used in aircraft canopies and other applications.

▶ **Baldwin-Lima-Hamilton Corp.**, New York, has acquired Ruge-de Forest, Inc., Cambridge, Mass., industrial testing equipment and electronics firm.

▶ **Wyman-Gordon Co.**, specialist in large forgings for aircraft, has opened an office at 3670 Wilshire Blvd., Los Angeles, Calif. In charge is Alan F. Bessemer. Assistant is Harold E. Burton.

▶ **Engineering employes** at Boeing Airplane Co.'s Seattle and Wichita plants accepted a new agreement that includes a 5% wage increase, new pension plan and higher overtime pay.



TEAMWORK

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These two great fighters incorporate **HARTWELL** *Flush Latches for aerodynamic streamlining and simple, fast accessibility.*

The HARTWELL Flush Latch has evolved in our modern aviation age as the ultimate culmination of positive-action, aerodynamically flush latches.

The Cowling heavy duty flush latches for power packs and nacelle lock in place by toggle mechanism and applied load holds them closed; simple tee-bolt and trigger opening action; they fit a wide range of structural curvatures.

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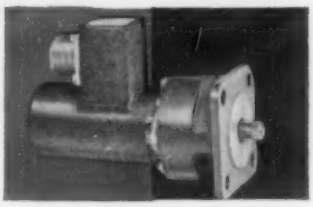
CONVAIR SAVES $35,000 annually using double-action pneumatic drill motors that in one operation drill and countersink twin rivet holes for attachment of nut plates. Operator inserts center mandrel in clearance hole; when the trigger is actuated, the mandrel expands pulling the combination drill-countersink into the sheet. The Winslow Engineering Corp. tool is capable of drilling up to ¾-in. aluminum alloy.

ANOTHER MICRON GEAR ACHIEVEMENT... It has been our privilege to cooperate with the Aircraft Products Division of Manning, Maxwell and Moore, Inc., of Danbury, Conn., in producing the 3-stage planetary gears for the Type 141RA3 Temperature Control Motor designed by them for the automatic control system installed by Westinghouse Electric Corporation into Chance Vought Cutlass fighter planes. This assignment calls for craftsmanship of the highest order, metals of strongest endurance, machining of maximum accuracy. Gears for the two planetary stages close to the motor are cut to AGMA Class Precision 2, while the output stage is cut to AGMA Class Precision 3. Overall reduction of the gear is 1040:1. Nominal backlash is 0.5 degree from motor to output.



All three planetary stages operate within a single piece of stainless steel ring gear. Planetary sun gears are stainless steel while planetary gear carriers and their integral pinion gears are machined beryllium copper. All planetary gears are journaled in precision ball bearings ranging upward in size from .078 inch bore.

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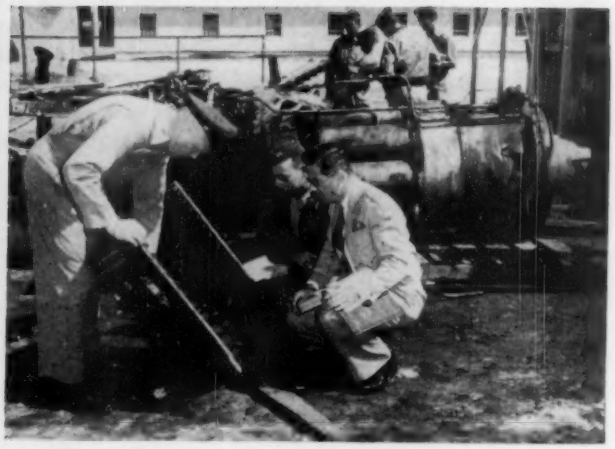
DAMAGED SABRE is arranged on ground in same pattern as accident wreckage. Students examine parts for signs of inflight failures.



STATOR DAMAGE is clue to localizing trouble in engine from compressor stall. Program is designed to develop flight safety officers.

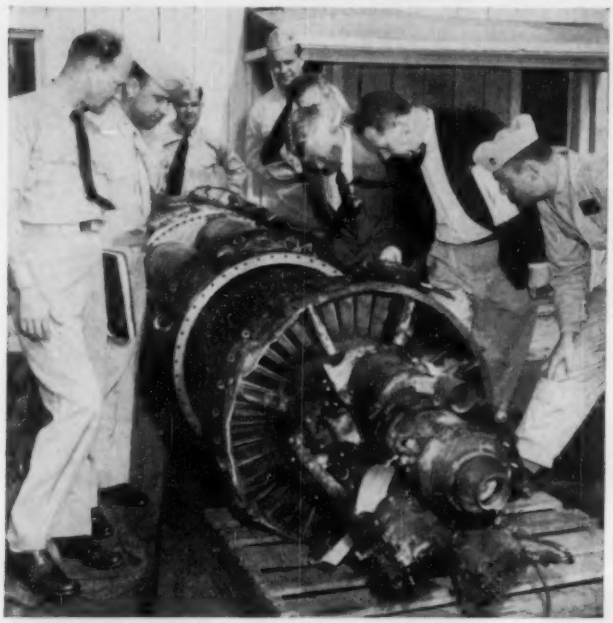
Pilots Study Accidents In Flight Safety Course

Wreckage from Navy and Air Force planes involved in recent accidents is being transplanted to sites at Norton AFB, San Bernardino, and the Naval Air Station, Los Alamitos, for investigation as part of the training course for flight safety officers at the University of Southern California.

This is the first attempt to give practical experience in investigation techniques as part of an educational program, according to Dr. Louis Kaplan, Coordinator of Flight Safety Training at USC.

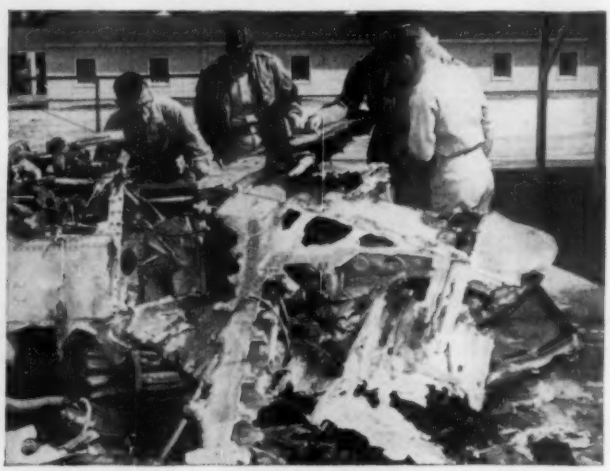
Problem shown in these pictures is an F-86D which crashed in a non-fatal accident at Norton AFB after the engine compressor stalled from fuel mismanagement. Wreckage was rearranged on the Norton site to provide the flight safety students with an actual investigation problem. Such clues to the accident as witnesses' statements, location of accident and localization of the trouble (in this instance the engine) are given the students. Cause of the accident is determined by classroom discussion and instruction, supplemented by examination of the wreckage.

The course at USC is designed to train Air Force, Navy and Marine pilots for duty as flight safety officers. RCAF also participates. The program began a little more than two years ago.



ENGINE CHECK is made by Navy and Marine student officers.

COCKPIT INTEGRITY is discussed by students with instructor.



SABRE TAIL gets a going over by USAF students in safety course.

COHRLASTIC PYLON HEATERS GUARD AGAINST ICE

. . . provide all-weather protection for the F-89D

Pylon fuel tanks slung on the lower wing surfaces of the U.S. Air Force's *Northrop Scorpion F-89D* increase its range without appreciably affecting speed. In order to prevent or remove *ice* accumulations on the leading edge of the pylons, *COHRlastic Heaters* possessing multiple wattage densities for variations in heat distribution to required areas were designed, in cooperation with Northrop Aircraft, Inc., engineered and produced as complete assemblies by *The Connecticut Hard Rubber Company.*

Special silicone rubber heating blankets sandwiched between aluminum covers were preformed and molded as complete assemblies. No change in the airfoil shape of the pylons was required because the outer surface of these light-weight, compact and rugged heaters provides the airfoil surface.

All *COHRlastic Heaters* meet MIL and AF specifications. They are easy to install, easy to control, and can be adapted to any size and shape. Exclusive construction features enable these heaters to provide uniform heat distribution for unlimited durations over large or small surfaces. *Cohrlastic Heaters* operate trouble-free in temperatures that range from —100°F to +500°F.

Perhaps *Cohrlastic electro-thermal* methods of protection can be applied with advantage to overcoming your serious *icing* problems in *hard-to-heat* areas. Our field engineers are available for direct contact. *Call or write today.*

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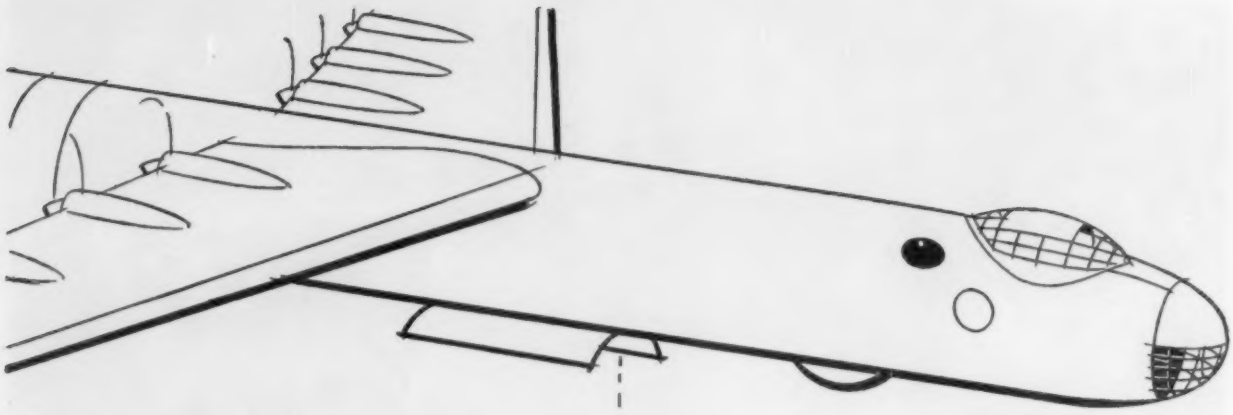

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(thanks to the supplies provided by the and each nation's share of the orders.

Italy's Aircraft Industry Passing Through Its Most Critical Period

Rome—The Italian aircraft industry, passing through perhaps the darkest period in its history, at least can boast of highly qualified experts and courageous directors.

This is the only encouraging element in an otherwise gloomy situation, and gives hope that, with the aid of the Italian government and the Western Allies, the industry will weather its depression.

Five-Year Plan

The industry's latest request, for a five-year plan and expenditure of $100-$120 million to be spent on aircraft engines and accessories and for the enlargement of experimental facilities, is seen as vital for survival.

Observers say that this program will not strain Italy's limited resources. They have hopes that the country's strengthening internal political position may make it possible. However, until the time such a program could be put into effect, experts believe industry will have to look mainly to orders from abroad.

Stronger Air Force

Outlook of the Italian Air Force is much brighter. In 1954, Air Force fighter squadrons completed their conversion to jet aircraft. Of the 25-group, 800-plane strength, some 500 are Republic F-84s and the remainder de Havilland Vampires and Fiat G.80s, used mainly for training.

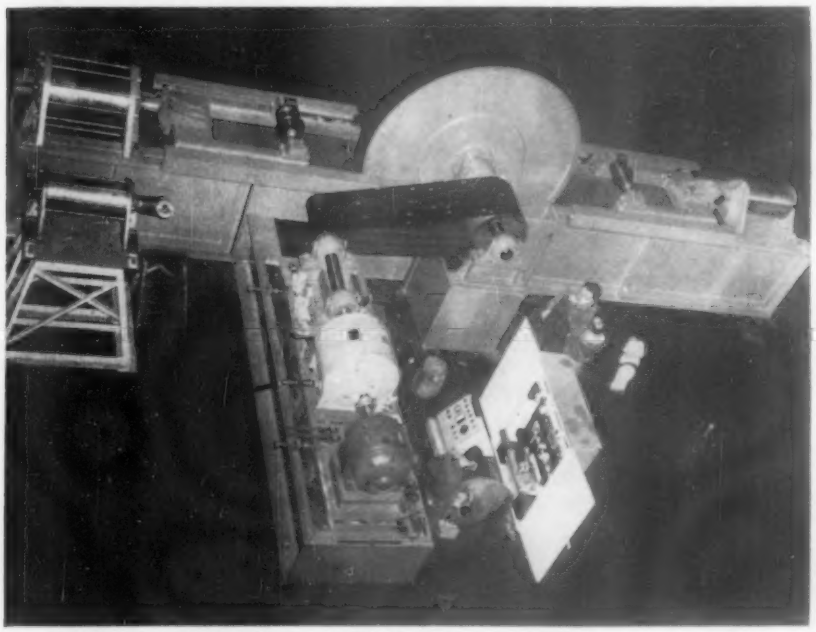
For transports, Italy depends on two groups of Fairchild C-119 Packets (20 planes in all) and some dozens of Douglas transports.

This modernization has been accomplished almost entirely through American aid, because of the straitjacket the budget puts on Italian aviation officials.

Each year, when the available funds have to be distributed between the several governmental departments, the Air Force conducts an active campaign, both in and out of Parliament, against its inferior position with respect to the other military services. The Air Force feels its aims do not exceed the present potential of the country. It wants adequate training facilities for the flying forces. Also it wishes to see made available the $34 million needed yearly in the opinion of Italian experts, to assure the efficiency of the existing plants of the Italian aviation industry.

How to Spend It

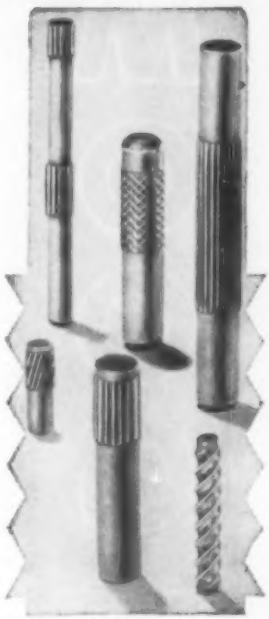
For fiscal 1954-55, the appropriation agreed on at a very critical moment of Italian home policy was fixed at 155 million dollars. Having to choose between training the flight formations that are constantly growing in number



Tires Will Get 250-Mph. Touchdown Test

Airplane tire test wheel, for simulated landings at 250-mph. touchdown speed, will be used by Armstrong Rubber Co. to develop tires for future aircraft. Test wheel measures 10 ft. in diameter. New equipment is installed at the firm's West Haven, Conn., plant.

CUT FASTENING COSTS with HASSALL THREADED PINS



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We are saving many of our customers from 20% to 50% on their special small threaded blanks. Cold forged parts are usually more economical and stronger than screw machine parts. Large or small runs are economical. Size may range from .024" to ¼" diameter and up to 1¾" in length....Let HASSALL quote on your small threaded blanks...we can show you real savings.

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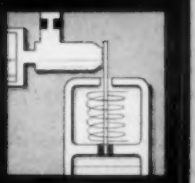

For the design, engineering and manufacture of electro-hydraulic servo valves and actuators.

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VALVE CO., INC.

PRONER AIRPORT

EAST AURORA, N. Y.

(thanks to the supplies provided by the U. S.) and giving orders to the Italian airplane factories, authorities sacrificed the requirements of the industry.

A large part of the $23-million which had been planned for building new aircraft was subtracted from the airpower appropriation.

The Italian aviation industry was one of the first in the world, before the war. The factories owned 43.5 million sq. ft. of covered space and employed 80,000 workers. At present, the covered area of the surviving factories amounts to 6.5 million sq. ft. which, it is estimated, could accommodate 30,000 specialized workers, who could build 3,000 tons of material worth $120 million.

When 1955 opened, it was reckoned that the labor force employed in the industry did not exceed 6,000 workers, mainly employed on off-shore orders—making spare parts and modifying engines of some types of American planes supplied to NATO—and in building training aircraft of Italian design (10-12 planes at a time), which the Italian aviation authorities now order only when forced to do so by the workers, threatened with unemployment.

NATO Uncertainty

The critical situation of the Italian aviation industry is made still more serious by the prevailing uncertainty as to NATO's plans for a common effort to secure the rearmament of the air forces.

Industry had hopes for the plan for the rearmament of the air forces, agreed on by the several European countries, dealing both with the size of the effort and each nation's share of the orders.

But the turn taken by political events in Europe last year has increased the distrust of the airplane manufacturers. Many have expressed the opinion that when these plans are at last drawn up, the Italian aviation industry will have ceased to exist.

Plane Production

The leading military-aircraft construction activity now carried is by Fiat, in Turin, and Aerfer, at Naples.

Fiat, besides building some models of the G.82 a jet trainer, has won in the NATO competition opened between the countries of the European Community with its model of a light fighter, the Fiat G.91.

The work of assembling the North American F-86K Sabres began in early 1955. Delays have been caused by technical difficulties (the need of adjusting the machinery and instruments to American standards) and to the political uncertainties, it is said here, of the American authorities who give the orders.

Aerfer has not yet completed the building of two models of a new plane ordered two years ago by the Italian Air Administration. The aircraft is a light fighter with arrow-shaped wings, the Sagittario II.

Aerfer is still engaged in building parts of the F-84 under license.

Trainers, Tourists

The production of light training and tourist planes is still on a very small scale, owing to the almost total absence of government orders.

Nevertheless some of those turned

Last of the Yellow Perils

Last biplane squadron still active in U. S. military service is made up of NAF-built N3N-3 trainers, float-mounted for operations in the Severn River, Md. Used now to indoctrinate midshipmen from the nearby U. S. Naval Academy, the N3N-3 is the Navy-built version of the Boeing-Wichita (formerly Stearman) N2S series of trainers in which thousands of student pilots received primary flight training during World War II.

PIONEER-CENTRAL DIVISION TAKES OVER

SOLE RESPONSIBILITY FOR SELLING AND SERVICING THE COMPLETE LINE OF

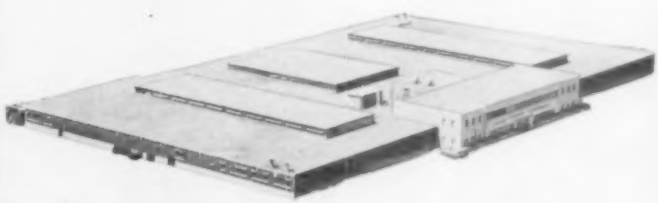
Bendix OXYGEN REGULATORS, LIQUID OXYGEN CONVERTERS AND SYSTEMS

Several years ago . . . as part of Bendix Aviation Corporation's over-all plan to achieve greater efficiency . . . the design, development and production of Bendix oxygen equipment was transferred from the Eclipse-Pioneer Division, Teterboro, N. J., to the Pioneer-Central Division, Davenport, Iowa.

Now the sales and service of Bendix oxygen equipment has also been transferred from Eclipse-Pioneer to Pioneer-Central. By combining in one location all the technical experience and specialized facilities needed to produce the world's most complete line of Oxygen Regulators and Liquid Oxygen Converter Systems, we are now able to serve your interests completely, efficiently and quickly.

Address your oxygen equipment inquiries to PIONEER-CENTRAL DIVISION, BENDIX AVIATION CORPORATION, DAVENPORT, IOWA.

West Coast Office: 117 E. Providencia, Burbank, Calif. • Export Sales and Service: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.



Pioneer-Central Division, Davenport, Iowa

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Far from being a fledgling in this activity, Air Arm's Electronic Flight Test Center is three years matured and still expanding. This unique facility is at the main plant and connected by taxi strip to Baltimore's modern Friendship International Airport. Westinghouse owned and operated, it consists of 48,000 square feet of hangar area, electronic test and administrative sections.

FIGHT Testing airborne systems is the job of Air Arm's Flight Test Center. Here, eight former military pilots, men with aviation backgrounds which total over a century of flying experience, keep as many as 16 prop and jet aircraft on the go. They subject equipment to every possible airborne rigor *before* it goes into operational aircraft. 110 highly trained and experienced Flight Test personnel—engineers, technicians, mechanics, armorers and aerologists are working hand in hand to insure that pilot, aircraft and airborne system form a perfectly matched combination for peak efficiency and performance.

Air Arm Flight Test is one of the many specialized facilities which enable us to produce the best in airborne electronics equipment and . . . to help you bring tomorrow's aircraft . . . One Step Closer. Westinghouse Electric Corporation, Air Arm Division, Friendship International Airport, Baltimore 27, Maryland. J-91030-B

Chief Project Pilots, Tom Lloyd and Fred Hughes, join on the ground, prior to debriefing, following an afternoon air-to-air gunnery check on a fighter armament system.

THE AIR ARM SYSTEMS FAMILY . . .

- **Fighter Armament**
- **Bomber Defense**
- **Flight Control**
- **Missile Guidance**
- **Special-Purpose**
- **Systems Components**

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Westinghouse

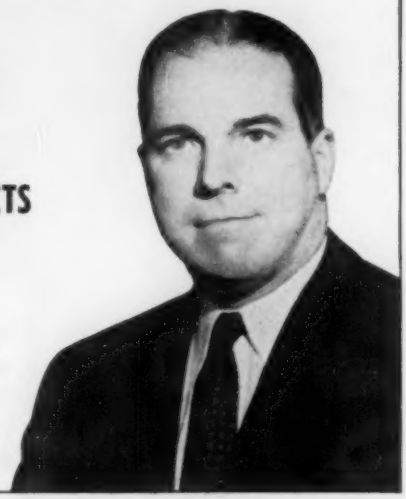
out have secured notable technical and commercial success abroad:

• **Agusta** works has completed its first series of Bell 47 helicopters, for which the Italian company has obtained ex-

Engineers!

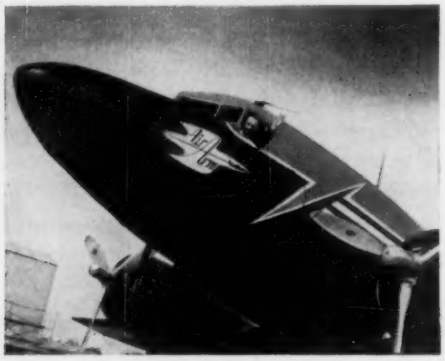
Airborne FIGHT Testing
is one of the many specialized
facilities behind your . . .

AIR ARM MAN WITH THE FACTS



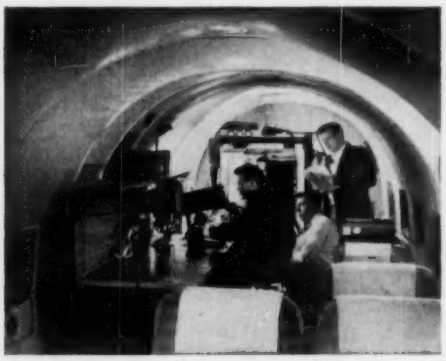
Mr. M. T. Lang

Can Milt Lang help you? Contact him at Westinghouse Electric Corporation, 501 St. Paul Place, Baltimore 2, Md. Telephone PLaza 2-0300. Or see his counterpart in your area through your local Westinghouse office.

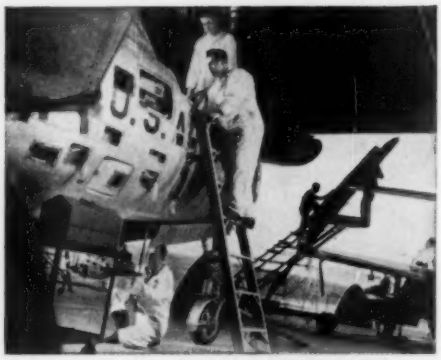


Bill Tyler, in charge of flight activities at the Center, applies his experience to the operation of flying test beds. In the Air Arm DC-3 Flying Lab, equipment gets a positive assessment of flyability.

Tom Lloyd, a chief project pilot, holds briefing with project and supervisory engineers. Finding the difference between simulated and actual performance is the reason for Air Arm Fight Testing.



A new fire control system is getting this Air Arm shakedown, using the DC-3 Flying Lab as the proving ground. All equipment gets this evaluation under actual in-flight tactical situations.



Complete support to operate flying test beds is an integral part of Air Arm. Maintenance is done on all types of aircraft by experienced ground crews using the finest equipment and hangar facilities.

J-91030-A

YOU CAN BE **SURE**...IF IT'S Westinghouse

out have secured notable technical and commercial success abroad:

• **Piaggio** has entered into an agreement with the Royal Aircraft Corp., Milwaukee, for the supply of a twin-engine amphibian, the P.136L, which will be fitted in the U.S. with American engines and known as the Royal Gull.

It is said that Piaggio is now completing licensing arrangements permitting a German firm to build the Italian company's two-seater P.149 for sport and tourist services.

• **Macchi** has granted a license to a German firm, Siebel, for building their touring two-seater plane M.B.308.

• **Agusta** works has completed its first series of Bell 47 helicopters, for which the Italian company has obtained exclusive European rights.

Important orders were received for these helicopters from France, Switzerland and the Scandinavian countries, it is reported. The same plant has plans for a civil twin-engine jet plane, seating 20-30 passengers.

• **Nardi** is negotiating with American firms, among them Bendix, granting rights to produce landing gear and wing system of their single-engine four-seater folding-wing amphibian, the F.N.333.

Belgian Air Force Builds Seven Wings, Improves Supply of Pilots

Brussels—The Belgian Air Force is growing up.

There has been a notable improvement in the supply of pilots, though figures are not yet available. The last of the trainees sent to the United States went in the summer of 1954. Henceforth, Belgium can rely on her own resources.

Pilots go first to the elementary flying school at Gassoncourt. After this they are sent for five months to the advanced school at Kamina in the Belgian Congo, where they fly North American T-6s. Kamina has completely replaced the earlier school located at Brustem, Belgium.

After Kamina, pupils return to the fighter school at Coxyde, Belgium, where they are trained on Meteor 7 jets.

Seven Wings

Belgium's Air Force maintains seven operational wings.

Three of them—First, Seventh and Thirteenth, based on Beauvechain, Chievres and Brustem respectively—are interceptor wings working in cooperation with the Dutch.

Wings Two, Nine and Ten, based on Florennes, Bierset and Klein Brogel, are tactical wings forming part of the Allied Tactical Air Force.

There are Belgian elements in Germany at ATAF headquarters and at group headquarters at Wahn (Cologne). Apart from these, Belgium does not maintain air force units in Germany, except that two squadrons of Tenth Wing are temporarily located at Geilenkirchen and Weelde until their base, Klein Brogel, is rebuilt and brought up to date. Wing headquarters at Klein Brogel is still maintained and one squadron is now able to use the runway, another being temporarily lodged at Bierset.

The tactical wings are still equipped with F-84G Thunderjets. They expect very shortly to be reequipped with F-84F Thunderstreaks and RF-84F Thunderflash photo reconnaissance aircraft.

The fighter wings have Meteor 8s and Meteor 11 night fighters. The Meteor 8s will eventually be replaced by Hawker Hunters.

Replacement of the Meteor 11 has been urged strongly, particularly since the unexplained failure of one of these last year lost Belgium her star night-fighter pilot, Wing Commander Roman. In view of the collaboration with the Dutch in interception work, it would be logical for the replacement unit to be the all-weather F-86D Sabre. There are, however, three other candidates: the Javelin, the Vautour and the Mystere 4B.

Air Force Manpower

Latest official statement of the strength of the Belgian Air Force shows—

• **Officers: 1,254.**
• **Non-commissioned officers: 4,177.**
• **Other ranks: 14,798.**

The flying personnel (pilots and navigators) include 465 officers and 308 non-commissioned officers: the technical personnel number 292 officers and 2,336 non-commissioned officers.

Personnel listed as other ranks include 8,808 corporals and airmen who are permanent personnel, having made the Air Force their career. The remainder are conscripts serving for 18 months.

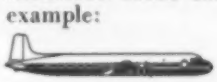
Transport Wing

The last of Belgium's formations is the Fifteenth Wing, the transport wing, which mainly concerns itself with the communications between Belgium and Kamina.

This is equipped with Douglas

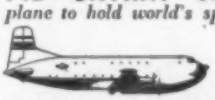
Engineers!
Join this winning team!

At DOUGLAS you'll be associated with top engineers who have designed the key airplanes and missiles on the American scene today. For example:



DC-7 "SEVEN SEAS" *America's finest, fastest airliner*

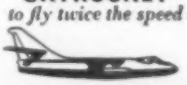
F4D "SKYRAY" *Only carrier plane to hold world's speed record*



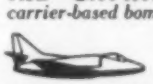
C-124 "GLOBEMASTER" *World's largest production transport*

NIKE *Supersonic missile selected to protect our cities*

"SKYROCKET" *First airplane to fly twice the speed of sound*



A3D "SKYWARRIOR" *Largest carrier-based bomber*



A4D "SKYHAWK" *Smallest, lightest atom bomb carrier*

B-66 *Speedy, versatile jet bomber*

With its airplanes bracketing the field from the largest personnel and cargo transports to the smallest combat types, and a broad variety of missiles, Douglas offers the engineer and scientist unequalled job security, and the greatest opportunity for advancement.

For further information relative to employment opportunities at the Santa Monica, El Segundo and Long Beach, California, divisions and the Tulsa, Oklahoma, division, write today to:

DOUGLAS AIRCRAFT COMPANY, Inc.

C. C. LaVene, Employment Mgr.
Engineering General Office
3000 Ocean Park Blvd.
Santa Monica, California

10 years of post-war progress in military aviation

These are some of the aircraft and missiles developed and built by Douglas within the past decade to provide solutions for almost every logistic and tactical problem confronting our military establishment.

But more important to our national defense than the aircraft themselves, is the experienced personnel that brings them into being. At Douglas this experience dates back 35 years, and is spread among thousands of men and women whose combined talents made possible: Globemaster's lift of 50,000-lb. payloads; Skyray's record of 753.4 m.p.h.; Skyrocket's speed of 1327 m.p.h.; new military horizons opened by such jets as the A3D, B-66 and A4D; guided missiles like Nike and rockets like Honest John.

This vast arsenal of experience made possible the Douglas concept of more performance per pound of plane; which is another way of saying—*more defense for your tax dollar.*

F4D Skyray

Only carrier plane to hold speed record

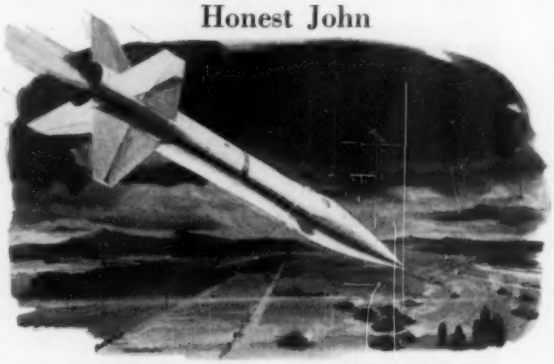
C-124 Globemaster

Biggest production transport, 25-ton payload

A4D Skyhawk

Can take off from small carrier with A-bomb

Honest John

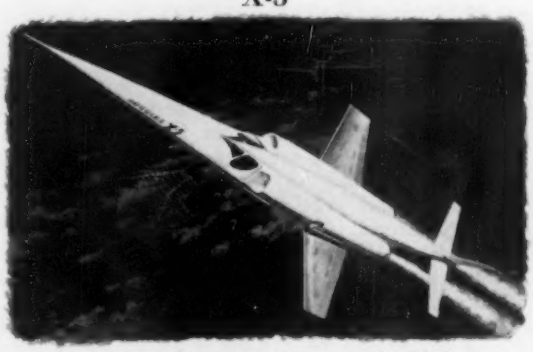


Delivers atomic or high explosive warhead

YC-124B

First military transport to use turboprop power

X-3



Jet research plane, performance classified

A D Skyraiders

Called world's most versatile aircraft

C-118A—R6D

Air Force and Navy versions of the DC-6A

Nike Rocket

Supersonic anti-aircraft missile already in service

D 558-2 Skyrocket

First plane to fly double speed of sound

A3D Skywarrior

Navy's largest carrier-based bomber

RB-66

Versatile Air Force reconnaissance bomber

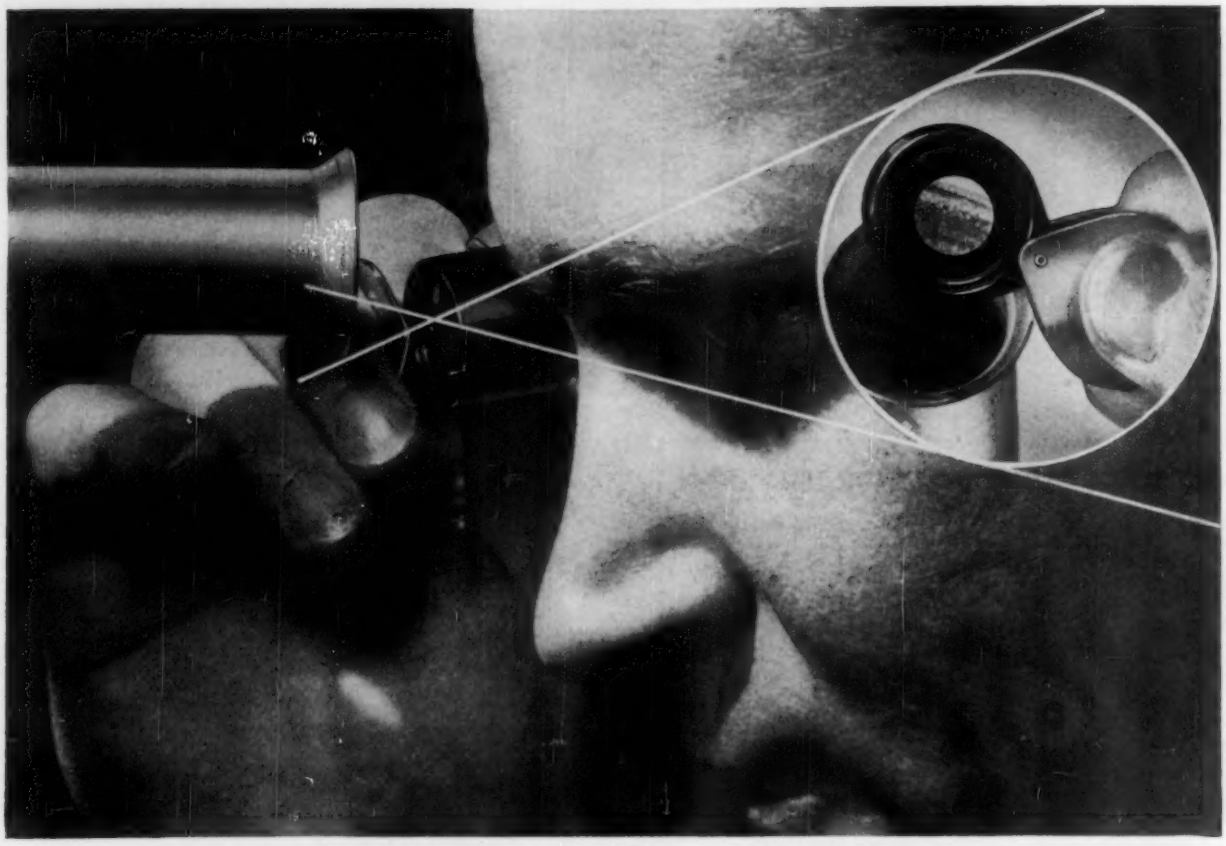
F3D Skyknight

Twin-jet, radar-guided night fighter

Depend on

DOUGLAS

First in Aviation



Examining flares in Superior Aircraft Tubing under 10x magnification.

Why "Superior" Stainless Hydraulic Tubing Gives You Above-Specification Quality

Here are some of the steps Superior takes to make certain first that its tubing meets specifications; second that it will save you time and money by eliminating rejects; third that you will get above-specification quality for long trouble-free life.

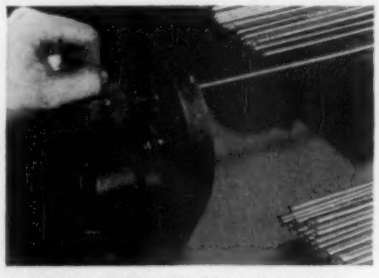
Even before material is released for production, a microanalysis is made to check grain size and intergranular precipitation. A chemical analysis is made, wall runout is checked. Samples are pickled and checked for carburization. A boroscopic examination is made of interior surfaces.

During production, the intermediate annealing heat treating operations are 100% automatically controlled. Cleanliness of aircraft quality hydraulic tubing is most important. Therefore a test is made to check for metallic chips and other foreign particles by running a white cloth through the ID of the finished tubing.

Final inspection involves more than checking for size, straightness, and internal and external imperfection. Tubing is 100% hydrostatically tested as well as flare tested. All flares are inspected under 10x magnification. All tests are performed under strict statistical quality control methods.

If you have a problem involving the production of high-quality aircraft tubing, Superior can undoubtedly solve it. Write SUPERIOR TUBE COMPANY, 2040 Germantown Avenue, Norristown, Pennsylvania. *On the West Coast:* Pacific Tube Company, 5710 Smithway St., Los Angeles 22, Calif.

RAW MATERIAL undergoing boroscopic examination.



FINISHED TUBING is 100% hydrostatically tested as well as tested for flareability.

Superior Tube

The big name in small tubing

All analyses available in .010" to ⅜" OD; certain analyses in light walls up to 2½" OD

companies collaborate with one Dutch (Fokker) company in building airpower for the arms program of the Western

stretcher at Davenport, Ia., capable of turning out 6-in.-thick pieces 12 ft. wide and 60 ft. long. The $10-million

DC-4, for passenger work and Fairchild C-119 Packets for the carriage of stores. During 1954, it was carried 2,120 passengers to Kamina and 300 tons of stores.

It was created in 1947 but did not really become active until 1949, when it was equipped with DC-3, and Oxfords. In March 1955, it will make its two hundredth sortie to the Congo from its base at Melsbroek, Brussels.

The use of Spitfires by fighter squadrons was completely discontinued as of last August.

Air Fields

The main intrastructur program has now been completed. Work is still continuing to repair early errors in laying the runways at Klein Brogel, and there is also work continuing in the Ardennes country on the building of diversion air fields.

There is also major work in progress at Gosselies, which is to become the main testing ground for Hawker Hunters built in the Benelux countries. Hangars are being extended to a full area of 25,000 sq. meters.

Air Industry

Belgium is not a major aircraft manufacturing country, but three Belgian

Bristol Profits Climb

London—Bristol Aeroplane Co.'s net profit increased to $2,236,446 during 1954, climbing from the preceding year's $1,631,450. At the annual stockholders' meeting last week, Bristol also announced the resignation of Sir William G. Verdon Smith as chairman.

Sir Reginald Verdon Smith, son of Sir William, will succeed his father as the company's top executive—a post held by the former chairman for 27 years.

As Bristol made its report, the turboprop Britannia started tank pressure tests in line with regulations drawn up after the de Havilland Comet investigation. The transport's tropical trials in Africa were completed last month.

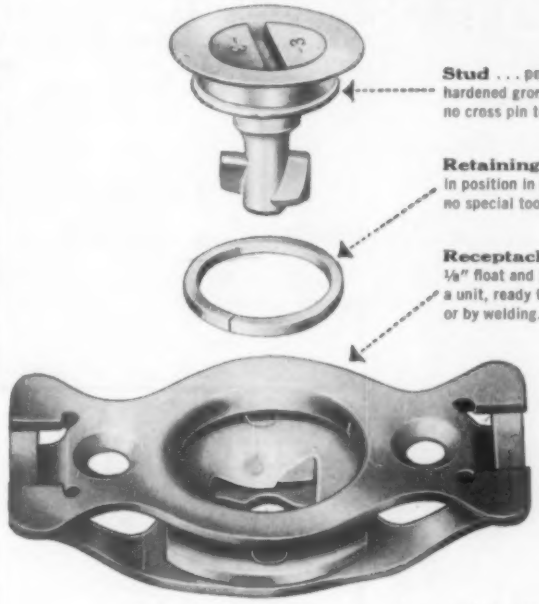
Sir William said of the Britannia: "The development phase has been an exacting one for all concerned, but the results promise to exceed our highest hopes. We can now say that our original confidence in the Britannia aircraft at the design stage has received renewed confirmation at each successive stage of development."

British Overseas Airways Corp. ordered 15 Mark 100 Britannias, eight Mark 300s and 10 long range versions of the Mark 300. El Al airlines placed a contract for three Mark 300LRs, plus an option on two more.

The British government ordered three long range Mark 250s as general passenger/cargo transports.

New "Style 3" Panel Fastener!

PANELOC introduces Light-Weight, All-Steel Model, Setting Superior Standards in Tension and Shear at a new low price! Only three simple parts to inventory.


Stud . . . permanently assembled to a hardened grommet, comes as one unit, no cross pin to loosen or fall out.
Retaining Ring . . . locks stud assembly in position in one simple operation with no special tools required.
Receptacle . . . all steel, with full 1/8" float and 1" rivet spacing. Comes as a unit, ready for mounting with two rivets or by welding.

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PANELOC...America's most versatile line of aircraft fasteners...includes Styles 1, 2 and 3 Panel Fasteners, High Performance Fasteners, Rotary Latches and Snap Fasteners.

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Send to:
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Company_____
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70% OF THE WORLD IS A POTENTIAL BASE FOR YOUR NEW NAVY

companies collaborate with one Dutch (Fokker) company in building airpower for the arms program of the Western powers.

The companies are Fairey Aviation (Belgian subsidiary of the British company) at Gosselies; Sabca (Societe Anonyme Belge de Construction Aerienne) at Evere, near Brussels: and F. M. (Fabrique Nationale d' Armes de Guerre) at Herstal, near Liege. With Fokker, they are now concentrating on the Hawker Hunter. The Fokker and Fairey facilities are concentrated on the aircraft itself, while FN works on the engine.

A feature of the year has been the increased amount of work allotted to Sabca, which employed 150 workers in 1953, 880 in October 1954 and expects to reach 1,100 in 1955. Sabca is mainly concerned with the mechanical equipment (landing gear, etc.) and with assembly. Since the runway at Evere, however, has been eliminated, the testing work is being transferred to Gosselies.

Alcoa to Install 8,000-Ton Stretcher

Aluminum Co. of America has signed an agreement with the Air Force to install an 8,000-ton aluminum plate stretcher at Davenport, Ia., capable of turning out 6-in.-thick pieces 12 ft. wide and 60 ft. long. The $10-million installation marks the plant's fourth major expansion of this operation in three years.

A 60-ft.-long heat treatment furnace, quenching and handling facilities and a 60-ft. aging furnace are included. It will be the largest piece of heat treating equipment in use in the world, says Alcoa.

All of the new equipment will be owned by USAF and leased to Alcoa. The facility is expected to be completed in about 18 months. USAF is paying $6 million; Alcoa is contributing $4 million to house the large items and will provide supporting equipment such as cranes, power distribution and other services.

Defense Dept. Asks Wider Titanium Use

Defense Department is encouraging the expanded use of titanium, not only in aircraft but in other products where it is "economically feasible at the price level we expect (it) eventually to reach," according to Dr. John B. MacCauley, Deputy Assistant Secretary for Research and Development.

Major recognized bottlenecks in expanded use of titanium were listed by MacCauley in an address before the Chemical Engineers Club in Washington.

- **Quantity** has been limited until recently.
- **Engineers** must have more design and test data.
- **Properties** are not uniform, forming is difficult and brittleness develops under some conditions of fabrication and use.
- **Manufacturers** are shying away from titanium because of lack of experience.
- **Titanium** is expensive.

In addition to seeking new uses for the metal, Defense Department is pushing an expanded research program on improved alloys, helping to improve fabrication methods and sponsoring experimental fabrication into military components.

MacCauley said technical problems have continued to plague the industry and demand has not reached advanced estimates, resulting in establishment of the Titanium Metallurgical Laboratory at Battelle Memorial Institute. Since 1948, he said, the effort has been carried on by all branches of the armed forces with as many as 79 laboratories participating in a two-year period. The Defense Department now has a steering group set up to co-ordinate the titanium program and make it more effective.

DOES THIS BUSINESS FLYER KNOW ABOUT YOU?

Airport Operator: Could he find your airport?

Dealer: Could he find your place of business?

Distributor? Does he know where to buy the products you sell?

This man is important to you. He is one of an ever-growing number of U. S. business pilots who together fly almost 4,000,000 hours every year. He wants to know about you—your airport—your services and products—because he is one of the legion of business pilots who are responsible for operating and maintaining an ever-growing business aircraft fleet that now numbers 21,500. For you, he represents a typical member of the business flying market that the most recent annual figures show spends more than $280 million on maintenance and modification, fuel and oil, and related airplane operating expenses . . . mostly at non-airline airports. Growing at its present rate, business flying will become a billion dollar business by 1965.

Tell this buying-power-packed market about yourself, and measure the results in profit dollars! Put yourself on the map—reach leading business and private pilots with a selling message that lasts all year—by advertising in the brand new, 1955-56 edition of the Aviation Week Airport Directory,—publishing June, 1955. Last year more than 5,300 copies of the Aviation Week Airport Directory were bought by the nation's leading business, executive, commercial and private flyers. These men depend on the Aviation Week Airport Directory as their guide to the airports and airport facilities that can best fill their service needs, and the needs of their passengers, as they travel from one part of the country to another.

Give yourself the representation you deserve. Make your advertising reservations now. Hurry—closing date is June 13. Your advertisement—or a cooperative advertisement with your suppliers—can be placed next to any airport listing in any geographical section you are interested in. Rates are low—about the same as for classified advertising in most newspapers, depending on the size of your advertisement, and your advertisement can be any size—even down to a single line. Fill out the coupon without delay to assure special attention and a good position for your advertisement. Make sure now—today—that leading business and private pilots will know about you.

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Please reserve advertising space for me in the 1955-56 Aviation Week Airport Directory and send me full information on rates, sizes, and positions available.

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★ **If your training and experience qualifies you for one of these challenging assignments, please telephone or wire collect:**

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Manager of Engineering
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Northrop Aircraft, Inc.
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★ **Expense-free Los Angeles interviews will be arranged for qualified applicants.**

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and then we built

Guided missiles and atom-powered submarines bring bold, advanced concepts to Your New Navy

Air and atomic power can now go to sea... *under water*. The U. S. Navy today has weapons with striking power beyond imagination... Regulus guided missiles and a growing number of Nautilus class atomic submarines.

Regulus missiles were designed and built by Chance Vought for submarine or surface ship operation. These deadly pilotless "birds" can deliver powerful warheads against enemy targets from hundreds of miles at sea. They have brought *air power* to the underwater fleet... a fleet that is being even further strengthened by atomic submarines able to cruise at high speeds around the world without surfacing or refueling.

Both of these new weapons are prime examples of the vital contributions made by Your New Navy to strengthen the U. S. Defense team.

Regulus saves tax dollars. Most missiles are built to make one flight, but one Regulus model, equipped with landing gear, has flown 15 times! For test and training purposes, this feature means more test data gathered and many more men trained at far less cost.

CHANCE VOUGHT AIRCRAFT
INCORPORATED · DALLAS, TEXAS

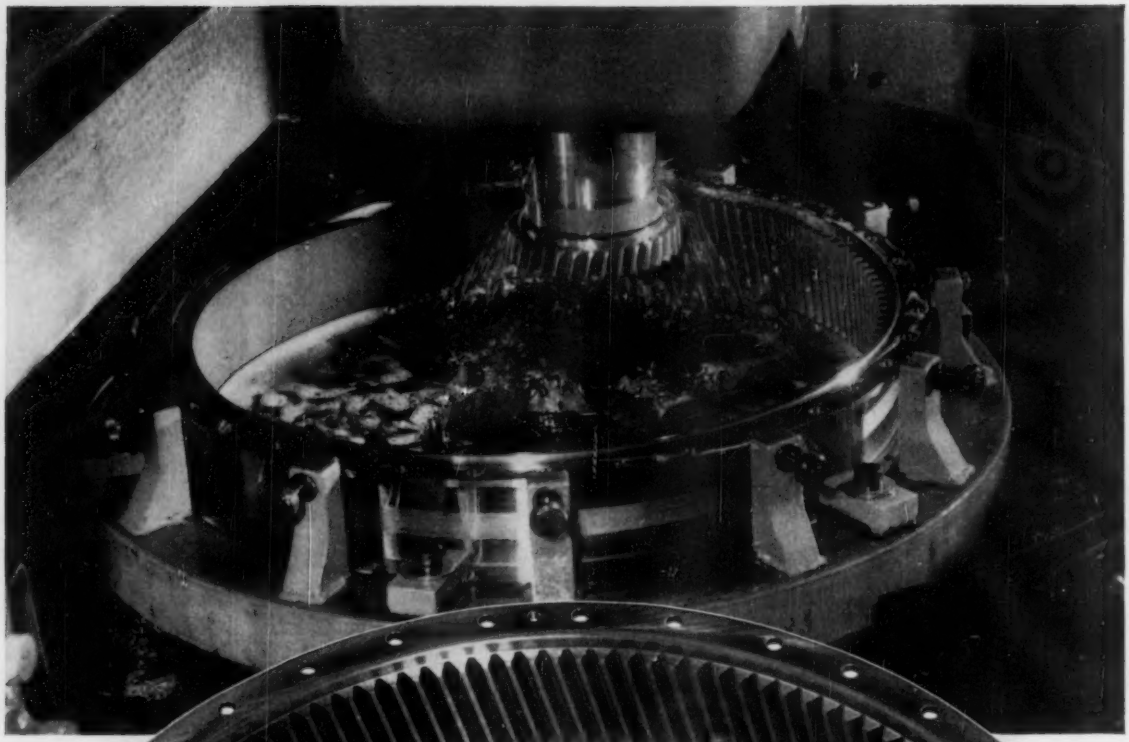
DESIGNER AND BUILDER OF HIGH PERFORMANCE MILITARY AIRCRAFT SINCE 1917

73

SEC Lists Salaries Of Aircraft Officials

president, $69,149; Frank Hedrick, vice president, $66,416; L. A. Wells, vice president (resigned, Aug. 4) $45,388; Joseph McNarney, senior vice president, $50,500 ($50,750); J. Geoffrey Notman, senior vice president, $88,000;

and then we built



This 7 pitch, 19.1564″ pitch diameter internal gear
for the Sikorsky S-58 Main Transmission

This HARD (Rockwell "50C") gear is cut after heat
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SEC Lists Salaries Of Aircraft Officials

Aviation firms reported remuneration to top officials in excess of $30,000 for the 1954 calendar year to the Securities and Exchange Commission as follows:

Lockheed Aircarft Corp. Robert Groas, president, $126,228 (plus retirement contribution $9,783); Courtlandt Gross, executive vice president, $94,971; C. A. Barker, vice president, $89,247 (plus retirement contribution $23,979); Cyril Chappellet, vice president, $68,913 (plus retirement contribution $8,018); Hall Hibbard, vice president, $68,688 (plus retirement contribution $9,084); Elwood Quesada, vice president, $45,769; Carl Sauire, vice president, $60,102; (plus retirement contribution $16,417); all directors and officers, $793,279 (plus retirement contributions $100,538.).

United Aircraft Corp. H. M. Horner, president, $185,750; Leonard Hobbs, vice president, $140,400; Frederick Rentschler, board chairman, $126,350; William Robbins, vice president, $111,409; all officers and directors, $1,018,529.

North American Aviation (year ended Sept. 30): James Kindelberger, board chairman, $170,000; J. L. Atwood, president, $124,000; R. A. Lambeth, vice president, $56,000; Raymond Rice, vice president, $62,800; J. S. Smithson, $56,000.

Bell Aircraft Corp. Lawrence Bell, president, $85,029 (plus retirement contributions $16,335); William Kepner, executive vice president, $61,057; Ray Whitman, vice president, $59,328 (plus retirement contribution $11,540); all officers and directors, $441,914 (plus contributions for retirement funds of $69,714).

Sperry Corp. Harry Vickers, president, $164,630; Thomas Doe, director, $66,705; Kenneth Herman, vice president, $98,010; John Sanderson, senior vice president, $132,070; all officers and directors, $847,825.

Fairchild Engine and Airplane Corp. Richard Boutelle, president, $127,068 (plus retirement contribution $14,430); Arthur Flood, executive vice president, $96,482 (plus retirement contribution $14,215); Willard Landers, vice president, $71,511 (plus retirement contribution $8,070); all officers and directors, $568,541.

Grumman Aircraft Engineering Corp. L. R. Grumman, board chairman, $61,967; L. A. Swirbul, president, $72,250; William Schwendler, executive vice president, $61,967; E. Clinton Towl, vice president, $40,033; all officers and directors, $459,928.

Beech Aircraft Corp. O. A. Beech, president $96,300; John Gaty, vice president, $69,149; Frank Hedrick, vice president, $66,416; L. A. Wells, vice president (resigned, Aug. 4) $45,388; remuneration for all officers and directors $362,165.

Cessna Aircraft Co. (year ended Sept. 30) Dwane Wallace, president $66,000; Thomas Salter, vice president, $37,500; Frank Boettger, vice president, $42,000; all officers and directors, $202,200.

General Dynamics Corp. remuneration by Consolidated Vultee prior to merger in parentheses John Jay Hopkins, board chairman and president, $146,365 ($6,750); Frank Pace, executive vice president., $56,821 ($2,500); Joseph McNarney, senior vice president, $50,500 ($50,750); J. Geoffrey Notman, senior vice president, $88,000; Lawrence Richardson, senior vice president, $43,132 ($2,250); O. Pomeroy Robinson, senior vice president, $47,154 ($2,250); Lambert Gross, vice president, $40,458 ($2,500); Roger Harris, vice president $30,708 ($2,500); J. V. Naish, executive vice president of Convair Division, $30,500 ($40,750); all officers and directors, $766,095 ($150,917).

Boeing Airplane Co. William Allen, president, $107,525; Wellwood Beall, senior vice president, $77,240; Fred Laudon, vice president, $48,055; J. E. Schaefer, vice president, $50,005; Ed-

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World's First Conversion Flight Made by McDonnell XV-1 Convertiplane

The announcement of the first successful conversion from Helicopter to conventional airplane flight, made on April 29 in St. Louis by the XV-1 Convertiplane, is another milestone in the long history of achievements by McDonnell engineers.

Other McDonnell "Firsts" were the XFD-1 Phantom, first all-jet airplane to take off and land on a U. S. aircraft carrier; the XHJD-1 Whirlaway, world's first twin-engine helicopter; the Little Henry, world's first ram-jet helicopter; the F2H-2P Banshee, first jet carrier-based photographic airplane. More recently the Air Force F-101A Voodoo, and the Navy F3H Demon have been developed and are now in production.

McDonnell has received new airplane and new missile development contracts. As a result, McDonnell offers engineers stimulating assignments in a variety of engineering fields working on:

Jet Fighter Aircraft	**Convertiplanes**
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Openings available for experienced engineers and recent college graduates. Write in confidence to:

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First Flight Of XV-1 Convertiplane

Schaefer, vice president, $50,005; Edward Wells, vice president, $62,060; J. O. Yeasting, vice president, $45,615; all officers and directors, $630,470.

Ryan Aeronautical Co. (for year ended Oct. 31): T. Claude Ryan, president, $50,000, (plus retirement contribution of $5,838); G. C. Woodard, executive vice president, $40,000, (plus retirement contribution of $4,670); all officers and directors, $186,175, (plus retirement contributions of $18,991).

McDonnell Aircraft Corp. (for year ended June 30); James S. McDonnell, president, $65,086 (plus retirement contribution of $9,036); Robert Charles, vice president, $38,773, (plus retirement contribution of $3,378); C. Warren Drake, vice president, $35,476, (plus retirement contribution of $3,363); Kendall Perkins, vice president, $31,528 (plus retirement contribution of $3,131); all officers and directors, $322,547, (plus retirement contributions of $38,063).

Glenn L. Martin Co. George Bunker, board chairman and president, $140,000; J. Brandford Wharton, vice president $70,000; George T. Willey, vice president, $50,000, plus $6,739 pension contribution; all officers and directors, $554,750, plus $34,043 in pension plan contributions.

Republic Aviation Corp. Mundy Peale, president $105,065; Walter Bain, vice president, $55,833; Alexander Kartvelli, vice president, $53,430; all other officers and directors $563,095.

Los Angeles Planning New Airport Project

Three architectural and engineering companies are developing plans and designs for new terminal facilities at Los Angeles International Airport to take care of the field's increasing traffic.

Gen. Ralph P. Cousins, president of the Board of Airport Commissioners, says preliminary plans to finance the project call for approval of a general obligation bond issue in the November 1956 election. Last year, Los Angeles voters refused to approve a $9-million bond issue to cover the cost of the airport's proposed new terminal building (AW Apr. 11, p. 21).

Of the new project, Gen. Cousins says: "This marks another major step in the development program to take care of the ever growing needs of International Airport, now the second busiest in the world. After intensive research and study to select architects and engineers for the terminal project, the Board of Airport Commissioners decided that the City of Los Angeles would best be served by the creation of this joint venture of architects and engineers for the all-important terminal development."

● This new Scott-Firewel miniature Oxygen Regulator system is doing a full-size job on the Douglas A4D "Skyhawk". The "Skyhawk" fulfills a need for lightweight fighter aircraft. This system helps solve giant problems caused by the need for miniaturization.

The regulator is attached to the pilot's standard oxygen mask. Resulting in a 100% saving of valuable panel space. The regulator itself weighs only 1¾ ounces as compared to 4¾ pounds of the standard regulator. A small ⅜ inch mask-hose replaces the regular, bulky breathing tube. These are only a part of the advantages of the new Scott miniature Oxygen Regulator System now available for military and commercial use.

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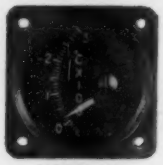
MODEL 17B, 2¾" case to AND 10401
—50 to +300°C Cylinder Temp. (AN 5536-1A or T1A)
—50 to +300°C Bearing Temp. . . .
0 to +1000°C Exhaust Temp.



MODEL 49B

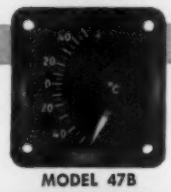
MODEL 49B, 1⅞" case to AND 10403
—50 to +300°C Cylinder Temp. . . .
0 to +1000°C Exhaust Temp.

MODEL 76B

MODEL 76B dual, 2¼" case to AND 10401
—50 to +300°C Cylinder Temp. (AN 5536-2A or T2A)
—50 to 300°C Bearing Temp. . . .
0 to +1000°C Exhaust Temp.

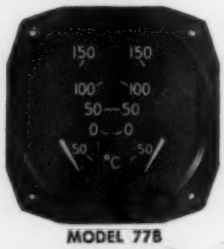
RESISTANCE TYPE

Accurate ratiometers, these LEWIS indicators are remarkably free of voltage error, have nearly linear scales (not crowded at the ends) and are magnetically shielded. A few typical ranges are given below. Not shown is Model 46B, 2¾" single.



MODEL 47B

MODEL 47B, 1⅞" case to AND 10403
—70 to +150°C AN 5790-6 or AN 5790T6
0 to +125°C Oil Temp. . . .
—50 to +50°C Air Temp.



MODEL 77B

MODEL 77B dual, 2¼" case to AND 10403
—70 to +150°C AN 5795-6 or AN 5795T6
+30 to +230°F Oil Temp. . . .
+100 to +300°C Cylinder Temp.

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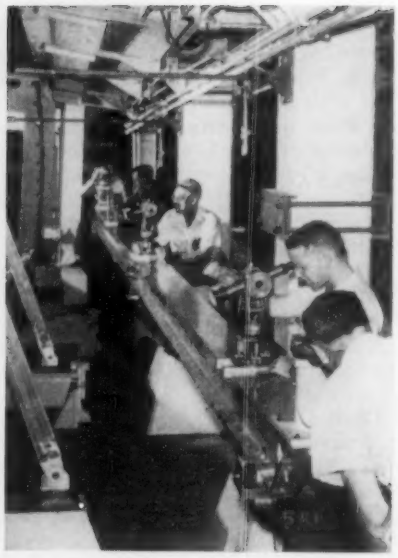

New Transit Saves On B-52 Tooling

Development of an optical transit square and a specially designed tooling bar for use in erecting B-52 Stratofortress major assembly jigs are expected to save Boeing Airplane Co., Wichita, nearly a quarter-million dollars.

The new technique offers four-point savings:

- Accurate basic reference lines can be established in less time.
- Set-up times are reduced.
- Multiple crew loadings are possible.
- Need for many master tools is said to be eliminated and simplification of gages is possible.

Optical transit square was developed by Boeing tool designers. The company pooled its information with that compiled by Ford Motor Co.'s Kansas City (Mo.) aircraft plant, saving about six months in getting the system into operation. Made by Brunson Instrument Co., Kansas City, it is said to be extension of the conventional jig transit application.

The new transit square has a hollow axis, one end of which is enclosed by a clear window and the other by a partially mirrored window that can be seen through or used for purposes of reflection.

Thus up to four units can be used on a single tooling bar, allowing four crews to work at once. The tooling bar has close tolerance holes drilled every 10 in. along the working surface, permitting a mobile carriage to be quickly mounted for indexing the transit square along the tooling bar.

In addition to the eight-jet B-52, which is also being built at Seattle, Boeing's Wichita plants are producing B-47E Stratojet bombers and RB-47E photo-reconnaissance aircraft for USAF.

Bendix International in Aviation

The part of Bendix in the technical progress of aviation is vast and varied. Because Bendix has always anticipated aviation's next advance, every plane that flies, in some way, relies on Bendix Creative Engineering.

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FLY WEATHER-WISE

These weather items prepared in consultation with the United States Weather Bureau

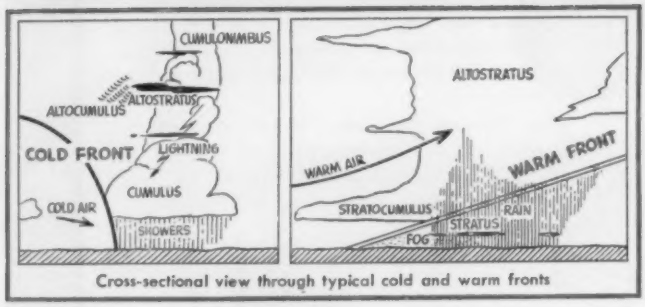
FRONTS may extend for hundreds of miles and cannot be avoided by local course changes, nor can they be topped at altitudes attainable by many planes. By understanding the principal features of FRONTS, however, it is possible to recognize them and make adjustments to the flight plan accordingly.

Here are the frontal characteristics:

COLD FRONTS—the advancing edge of a cold air mass: Showery type of rain or snow, thunderstorms—Cumulus-type clouds—Sudden wind shift after the storm, usually to W, NW or N—Drop in temperature after wind shift. Clearing weather, sometimes slow.

WARM FRONT—retreating edge of a cold air mass overrun by warm air: Steady precipitation—not showery—Stratified cloud layers—Gradual wind shift to S, SW or W—Rise in temperature and humidity—Temporary clearing.

OCCLUDED FRONT—The upper front resulting from collision of cold front and warm front: Best recognized on weather chart, but when events indicate a mixture of cold front and warm front characteristics, it's likely an occlusion has taken place.



Cross-sectional view through typical cold and warm fronts

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The more you know about the weather, the greater your chance of predicting its performance. The same is true of the products that power and protect your engine.

Pilots who use Mobilgas Aircraft and Mobiloil Aero know they exceed rigorous Army and Navy specifications . . . that they've been first choice of air pioneers—Lindbergh, Earhart, Byrd and many others. It's safe to predict that with these products in your plane your engine will run smoother . . . perform better than ever. *Fly safely . . . Fly with the Flying Red Horse!*

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New Lightplane Tacan Weighs Under 25 Lb., Costs $2,000

A new element has appeared in the Tacan vs. DME controversy, with the announcement by IT&T's Federal Telecommunications Laboratories of a new, simplified, personal-plane Tacan receiver (AW May 23, p. 109).

P. C. Sandretto, technical director of FTL, says the new set will package in one box the functions of distance and bearing intelligence plus transponder beacon. Cost will be $2,000.

Bearing accuracy will be equivalent to current VOR private-plane equipment, Sandretto, says; distance accuracy will be about one-half mile or 3%, whichever is greater. FTL officials say military-type distance accuracy will soon be built into the private-plane sets. Prototype equipment will be flight-tested in July, with production scheduled for October.

The set will contain fewer than 40 tubes, weigh about 25 lb., and measure 6x8¾x14 in.

One big advantage of the private-plane Tacan, as Sandretto sees it, is the substantial reduction in vacuum tubes and elimination of all but a single antenna on the outside of the plane. Cutting the number of tubes greatly increases the set's reliability, Sandretto says.

He draws this comparison to point up the relation between equipment reliability and number of tubes used:

• **Conventional system** incorporates VOR, DME, beacon, marker, localizer and glide path, and uses 151 tubes and probably four antennas—one each for DME and beacon; localizer and VOR; glideslope; and marker receiver. Probability of failure on a 10-hr. mission is 48%.

• **Coordinated Tacan system,** when providing the same services as the conventional system, uses only 76 tubes. Probability of failure drops to 28%.

If the 151 tubes of the conventional system were retained with Tacan, two separate systems could be provided, one

of them a standby, Sandretto says. This would shove the probability of simultaneous failure down to 8%.

Sandretto quotes these additional figures to show importance of keeping number of tubes to a minimum: based on a 10-hr. mission, with 500 tubes, the failure rate is indicated as 87%; with 250 tubes, 65%. Even if "reliabilized" tubes are used, failure rate with 250 tubes drops only to 40%.

Main advantages of the single antenna are reduction in weight and drag, and simplified installation. The antenna is a pole type, 6 in. long and 1 in. in diameter.

Tacan was built around Radio Tech-

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a time for reflection

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"where the future is measured in light-years"

PRIVATE-PLANE TACAN would combine distance and bearing data in a single package.

nical Commission for Aeronautics' SC-31, and met the requirements of the specification with hardly any qualifications, says Sandretto.

The purpose of the special committee was to set up a national program for air navigation and traffic control suitable for all airspace users. FTL feels Tacan fills the bill. Now is the time to convert existing ground DME equipment to Tacan, before the investment grows too great, Sandretto says.

Comparatively recently, one of the Civil Aeronautics Administration's ground DME equipments has been modified to give service to airborne Tacan equipment. The cost involved in such a conversion (on a breadboard basis) was only $200. A conversion suitable for the field would be less than $2,000.

"Thus, the entire program (VOR/DME) could be reoriented back to the original SC-31 plan at a cost of $2,000 per CAA station in addition to scrapping the few existing civil airborne DME equipments," FTL claims.

"The entire program can be oriented back to the SC-31 plan by modifying the CAA ground DMEs and replacing groundless recriminations with a liberal dose of goodwill."

Over 100 U. S. Planes Getting Sperry A-12s

Four major U. S. airlines now are planning to install more than 100 Sperry autopilots with various types of landing approach couplers.

At the head of the list of Sperry customers is United Air Lines, which will install A-12 Gyropilots in 43 DC-7s, DC-6Bs and DC-6As. American Airlines will place the units in 27 DC-7s, Pan American World Airways will install the equipment in its new fleet of 23 DC-7s and Western Air Lines will put A-12s in the five DC-6Bs it has on order.

The PanAm planes will also get the new Sperry Z-4 Zero Reader.

Internationally, Saudi Arabian Airlines will equip its 10 Convair 340s with A-12s having automatic approach couplers plus Sperry gyro-horizons and Gyrosyn compasses.

HIGH PERFORMANCE
PRESSURE SWITCHES

These recently developed aircraft pressure switches cover operating points within the entire range of inches of water through 3000 psi. Construction materials are compatible with operating media encountered in current and foreseeable aircraft applications. Design features permit all switches to meet or to exceed the requirements of MIL-E-5272A and other applicable performance specifications. The three illustrated here are widely adaptable for specific applications — demonstrate the high performance standards of our complete line.

Our long experience and extensive facilities for developing, manufacturing and testing pressure switches for modern aircraft can be helpful to you. Engineering counsel is at your service. Please direct your inquiry to our headquarters plant, Danbury, Connecticut.

Differential Pressure Switch, Type 6840

DIFFERENTIAL ADJUSTMENT RANGE: 10 to 50 inches of water. **RESET VALUE:** 1.5 inches of water. **EXTERNAL ADJUSTMENT:** Doubly locked. **TEMPERATURE RANGE:** Minus 65° F. to plus 165° F. **WORKING PRESSURE:** 5 psig maximum. **PROOF PRESSURE:** 10 psig without setpoint drift. **VIBRATION:** Models available capable of meeting MIL-E-5272A Procedure I. **OVER-ALL DIMENSIONS:** Height 4-3/16", Width 6⅛", Length 6⅛". **WEIGHT:** 1 lb. 10 ozs.

Pressure Actuated Switch, Type 6885

PRESSURE ADJUSTMENT RANGE: 0-10, 10-50, 50-100 psi. **ACCURACY OF SETTING UNDER ALL TEST CONDITIONS:** 0.5 psi at 5 psi setting; 4% at 50 psi setting; 3% at 100 psi setting. **EXTERNAL ADJUSTMENT:** Knurled nut doubly locked. **TEMPERATURE RANGE:** Minus 65° F. to plus 250° F. **PROOF PRESSURE:** 750 psi without setpoint drift. **VIBRATION:** Up to 2000 cps. at 20g. Integral vibration isolation provided between mounting bracket and switch body (see illustration). **OVER-ALL DIMENSIONS:** Switch proper 2" diameter. Length 4⅜". Mounting bracket to suit application. **WEIGHT:** 9 ozs.

Hydraulic Pressure Switch, Type 6891

PRESSURE ADJUSTMENT RANGE: 500 to 3000 psi. **ACCURACY OF SETTING:** ±60 psi. **RESET VALUE:** 100 psi. **TEMPERATURE RANGE:** Minus 65° F. to plus 275° F. **PROOF PRESSURE:** 4500 psi without setpoint drift. **VIBRATION:** MIL-E-5272A Procedure I. **OVER-ALL DIMENSIONS:** Height 2¼", Width 2¼", Length 4-19/64". **WEIGHT:** 15 ozs.

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New Foam System Guards Eglin Hangar

A new type of hangar fire protection system which combines water deluge sprinkling with Airfoam has been installed and successfully tested at USAF's Air Proving Ground Command, Eglin AFB, Fla.

The hangar in which the system is installed measures 300 x 300 ft. Height ranges from 66 to 104 ft., at the top of the truss.

The building poses a big fire protection problem, because it could house two B-36s or similar-size aircraft, with more than 30,000 gal. of gasoline in their fuel tanks.

This quantity would be sufficient to flood the entire floor area with a pool of aviation fuel half an inch thick.

How It Works

Special problem in protecting this hangar and aircraft, contrasted with conventional buildings, is that the contents of the hangar may be many times the value of the building itself.

The foam-water sprinkling system is triggered into action when temperature rise rate in the hangar indicates the start of a fire. This opens the water deluge valves. As water flows into the sprinkler system it trips combination deluge valves positioned in the foam liquid line.

Water and foam liquid are mixed at the sprinkler valves. The combined solution passes through fins which give it a swirling motion. As the solution is discharged through sprinkler orifices, air is then entrained to produce the Airfoam.

Numerous pumps push the combined foam-water through 12 separate sprinkler systems which make up the overall fire extinguishing system. Airfoam is discharged through 1,252 sprinkler heads to fill the entire hangar with the extinguishing agent. The Airfoam blanket first flows over the hangar's steel superstructure, then drops to the floor to form a vapor-impervious fire-smothering blanket.

Air-foam discharge may be initiated manually. The system may also be operated automatically as a standard deluge sprinkler system discharging water only, or foam only can be discharged.

Equipment used includes three 4,000-gal. fire pumps which draw water from a 600,000-gal. water reservoir; a 10,000-gal. foam liquid storage tank supplying a 750-gpm. centrifugal foam pump; two 10,000-gal. reserve foam storage tanks.

CARPET OF FOAM covers floor of Air Proving Ground Command special hangar at Eglin after test of new protective system. Foam was later flushed away with water.

Airfoam Benefits

Automatic Sprinkler Corp. of America, Youngstown, Ohio, manufacturers of the system, cite these benefits:

- **Airfoam can flow** along the floor and thus extinguish fires under aircraft wings and fuselages.
- **Airfoam will extinguish** the surface flames of gasoline pools burning on a hangar floor and allow non-burning fuel to flow under the Airfoam blanket to drains.
- **Fuel spillage** and associated localized sources of flash fires may be avoided because any one of the 12 individual sprinkler systems may be manually operated to discharge foam only. The resultant foam blanket will snuff out any incipient fires and allow an aircraft to be towed out of the hangar with maximum safety.

Cleanup following use of foam is simple. The system is set to discharge water only, flushing the protective foam blanket down the floor drains.

Bearings Face Tough Jet Tests

Ball bearing rotational speeds in today's jet engines range from 8,000 to 14,000 rpm. for the 130 to 150-mm. bore sizes, representing conditions at least three times as severe as those encountered by conventional bearings. In combination with very high loading conditions, this means that conventional ball bearings cannot do the required job, says Heinz Hanau, aircraft project engineer with New Departure division of General Motors Corp., New Bristol, Conn.

Military aviation bearings must also operate for a limited time with little or no lubrication (to allow the plane time to land if lubrication fails or is battle-damaged), withstand soak temperatures of over 500F after engine shut-down and be highly reliable. To resist such temperatures, bearings will have to be made of tool steel, Hanau says.

Jet engine bearing applications are twofold: main shaft bearings which support the compressor and turbine assembly, and accessory gear drive support bearings.

To give the main shaft bearings the greatest possible capacity, split inner ring designs are used. Higher thrust shoulders, balls of the largest possible diameter and one-piece machined cages all contribute to high bearing reliability and longevity.

If heavy thrust loads exceed the design capacity of such a bearing, two accurately matched units can be used to reduce the load per bearing.

Although accessory gear drive bearings operate at temperature and speeds only slightly above those found in

. . . from field-testing harvesters to checking jet starter performance . . .

SANBORN OSCILLOGRAPHIC RECORDING SYSTEMS prove their versatility

Research and Development

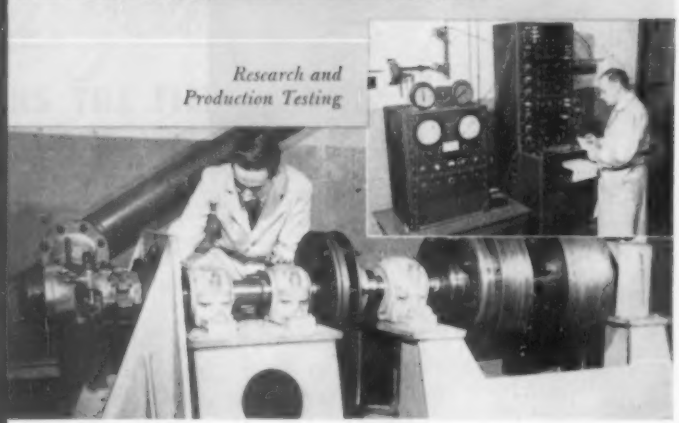
FOR INTERNATIONAL HARVESTER'S ENGINEERING TEST AND DEVELOPMENT DEPT.

A specially housed and shock-mounted Sanborn 2-channel recorder provides dynamic strain measurement data on a field forage harvesting machine, during actual field use. In the photographs, rotor shaft torque and RPM are being recorded, one of several uses International Harvester has found for the Sanborn System in field testing their farming equipment.

Production Testing

AT ARCH GEAR WORKS, QUINCY, MASS. . . .

A record of tooth regularity of various types of precision gears is obtained on a single-channel Sanborn Model 141 System, used in conjunction with a special gear checking instrument devised by Arch Gear Works. The equipment permits visual spot checking of gears, helps maintain a high rate of acceptability and provides a permanent record of tests often required by customers.

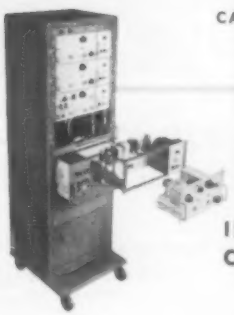


Research and Production Testing

AT G. E.'S AIRCRAFT GAS TURBINE DIV. . . .

Engineers record performance data such as temperatures, pressure, RPM and starting time of jet engine starters, using a modified Sanborn Model 67 System. Six channels of information are recorded in this four-channel unit, equipped with three DC amplifiers, one Triplexer, a four-channel DC Converter, two-channel zero suppression network and two modified strain gage amplifiers. The data also provides G. E. engineers with an indication of the performance of all production units.

These typical applications indicate the scope of usefulness of standard and modified Sanborn Recording Systems. Wherever accurate, permanent, graphic registration of electrical phenomena in the 0-100 cps range is required, the *versatility* and *flexibility* of Sanborn one-, two-, four-, six- and eight-channel systems will prove invaluable. A wide variety of readily interchangeable, plug-in preamplifiers enable *one* basic system to meet *many* recording requirements. Standard instrument features include inkless recording in true rectangular co-ordinates, high torque galvanometer movement, time and code marking, and a choice of nine chart speeds.



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AIRCRAFT VOLTMETER
Range: 150 VAC
Supplied in 400 cycle, 350-1000 cycle, 800-1400 cycle frequencies.

DUAL VOLT-AMMETER
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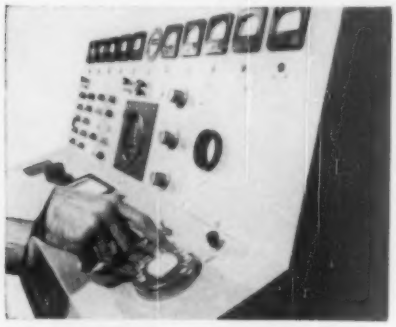
average applications, the high-reliability requirements results in using bearings to ABEC-5 tolerances and of specially machined, land-riding cages of high-strength materials, according to Hanau.

New Departure is engaged in an intensive research program to develop bearings capable of giving reliable service in the higher-rated engines now being designed.



Panel Checks Cameras

High degree of skill is not needed to operate new test rig that quickly locates malfunctioning parts and controls of aerial cameras.

Camera is plugged into the test board and the operator dials three numbers—a set for each camera model—on a telephone-type dial. This actuates circuitry in the panel so that standard results follow from tests carried out by the inspector.

Gordon Enterprises, N. Hollywood, Calif.

Tape Collar for Props

New Teflon-aluminum tape collar for Hamilton Standard variable-pitch propeller blade shanks is said to prevent erosion and present soaplike, free-sliding surface for a rubber seal to ride on. It is also claimed to eliminate oil leakage and lengthen life of the seal. The tape, called Fluorolin 404, consists of du Pont Teflon bonded to aluminum foil and coated with a heat-resistant adhesive. Maker, Joclin Mfg. Co., North Haven, Conn., says BOAC has ordered the tape in quantity, and nine other airlines are conducting service tests.

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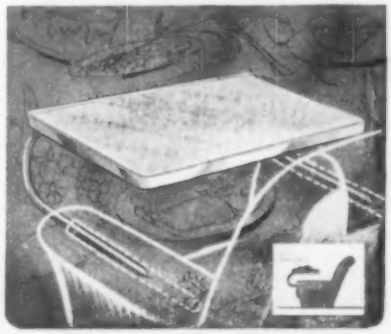

Aircraft serving tray . . . another fine product by SKYLINE

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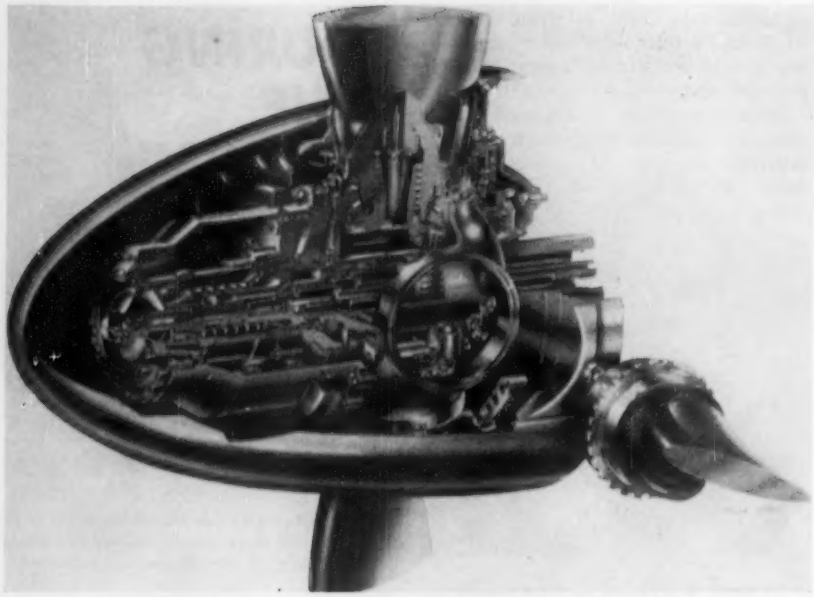

BLADE PITCH CONTROL of the Rotol prop installation is shown in phantom view.

Details of Viscount's Rotol Props

The Rotol turbine-powered propeller installed in Vickers Viscount airliners will be seen with increasing frequency in this country as Capital Airlines' fleet of turboprop transports goes into operation.

In addition, United States Steel has recently ordered three of the ships, and other operators of executive aircraft are reported ready to follow suit.

To date, the Rotol installation has logged over a quarter of a million flying hours in two years of foreign airline operation.

The following story details the operational and safety features that apply to Rotol props fitted to the Rolls-Royce Dart 510 turboprop engines on Capital's Viscounts.

There are no cockpit prop controls for normal operation—the blade pitch change mechanism is coupled with the engine throttles, a simplification for the pilot. Feathering buttons are available for emergency use. Props coarsen automatically in three seconds if an engine fails during takeoff or initial climb.

During takeoff, as throttles are advanced, prop blades automatically and rapidly coarsen pitch to absorb increasing engine power. Even if throttles are slammed open, prop overspeed does not exceed 150-200 rpm., says Rotol, and the condition is corrected in one beat.

At cruise, as in all other conditions, an automatic prop synchronization system holds the four sets of blades to within a quarter of a revolution.

Electrical de-icing is provided for the prop blades, spinner and engine air intakes. Co-pilot has a two-position switch which allows him to take care of normal or severe icing conditions. Four switches supply current to each prop spinner and intake individually.

Propeller control at landing also is automatic, the blades returning to fine pitch as power is reduced. On final approach, throttles of the Viscount are closed at approximately 100 ft. of altitude and 120 knot airspeed. At this point, prop blades are at flight fine pitch, or 24 deg. As soon as the plane lands and its weight compresses the landing gear struts, microswitches allow blades to swing to the ground fine pitch stops—4 to 8 deg. This occurs at an aircraft speed of about 70-75 k. with the propeller blades providing smooth but appreciable deceleration.

Prop Details

The propeller pitch change mechanism incorporates a simple effective lock at the takeoff fine pitch setting of 24 deg. The stop can be "unlocked" to allow blades to move to superfine 4-8-deg. pitch to reduce prop drag to a minimum during engine starting, for ground operation and deceleration.

Electrical circuits energizing this stop provide double fault protection. The stop is usable only when the plane is on the ground. Rotol says no failure of this stop has ever been reported.

Nevertheless, at the request of the Civil Aeronautics Administration, Rotol has installed an emergency stop at 21 deg., three degrees below the normal fine pitch stop. The new stop notifies the pilot that the blades have swung below the 24-deg. stop, by turning on a warning light in the cockpit. It also energizes the propeller's blade-coarsen-

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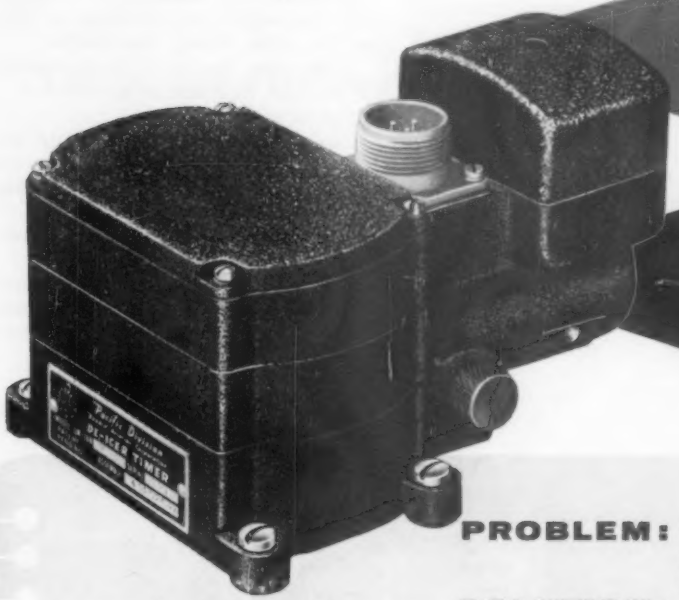

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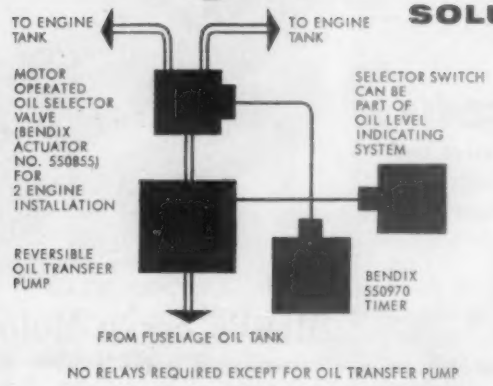
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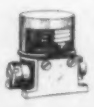			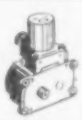

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ing circuit. This stop like the one at 24 deg., automatically becomes inoperative when the aircraft is on the ground and very fine prop pitch angles are required.

Automatic prop coarsening takes place instantaneously in the event of engine or prop control failure during high engine power output. System is controlled by the engine torquemeter, which initiates the coarsening action at a predetermined "no torque" condition. As soon as the engine produces torque again, system returns the propeller to normal operation.

Props may be feathered manually independently of the automatic coarsening action. To do this, the fuel cock lever is turned off, mechanically setting the prop control unit in the full coarse pitch position. Then the feathering button is pushed to start an independent electric feathering motor and pump.

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Prop blades emerge from the spinner with an airfoil instead of a round section, resulting in improved aerodynamic efficiency. Light, stainless sheathes cover the blade leading edges to resist erosion and corrosion.

Maintenance

Props can be mounted or removed from the engine shaft without disturbing the pitch change mechanism.

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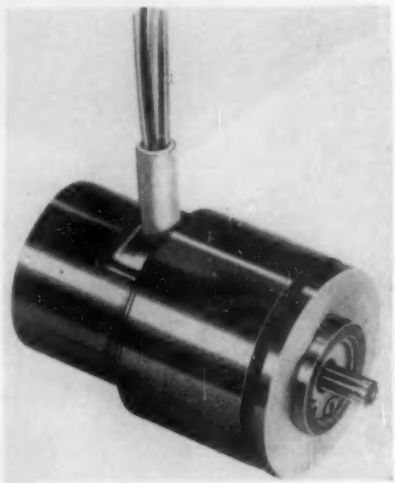

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Theoretical acceleration is 12,000 radians/sec. and stopping takes 0.02 sec. with no external inertia loading. Unit measures 0.938 in. o.d. x 1.5 in. long and weighs 2.56 oz. No-load speed is 7,000 rpm., stall torque 0.30 in.-oz. and total rotor inertia 1.8 gram cm. Input power is three watts per phase and input current with motor installed is 175 ma. Servo motor excitation is 26-v., 400-cycle, two-phase and brake excitation is 27-v. d.c.

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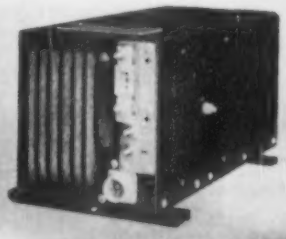

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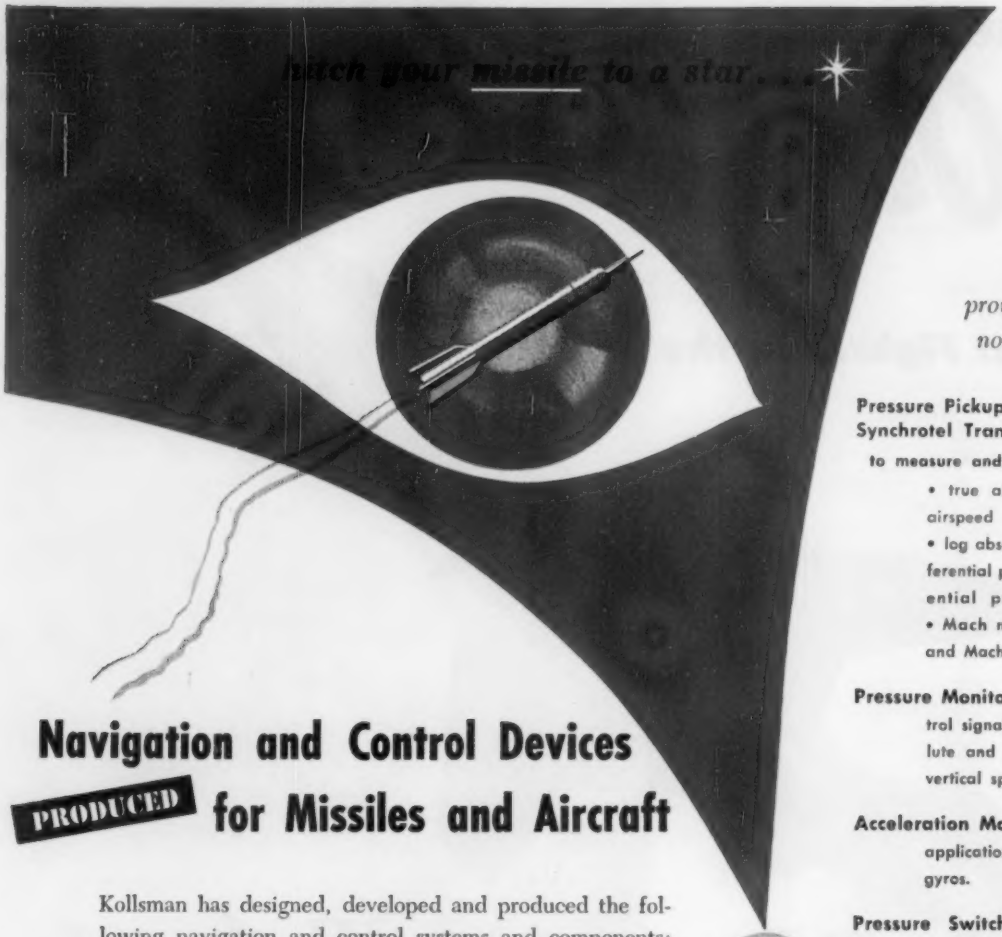

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New Testing and Measuring Devices

Three new electronic devices for testing and measuring have recently been announced by Gulton Mfg. Co. Details and applications of the new products.

• **Glennite P450 dynamic pressure transducer** is designed for general laboratories to measure wide-range, fast, transient pressure variations. The maker recommends its use with its Glennite cathode followers Models F400, F405A and F407A. Cylindrical instrument has a circular sensitive area 9/16-in. in diameter at one end and a miniature coaxial connector at the other end. Item employs a highly sensitive piezoelectric ceramic transducer.

Open circuit sensitivity is said to be 500 mv./psi.; natural frequency 185 kc.; pressure range 0.001 to 500 psi.; frequency range 25-20,000 cps., and temperature range —40C to 90C.

• **Glennite ultrasonic probes** are available in two models: LU 100 with frequency response from 100 kc. to 2 mc.; LU 101 responding from 100 kc. to 3 mc. In the 100 kc. to 800 kc. range the instruments accurately measure ultrasonic intensities; beyond 800 kc. they can be used as detectors.

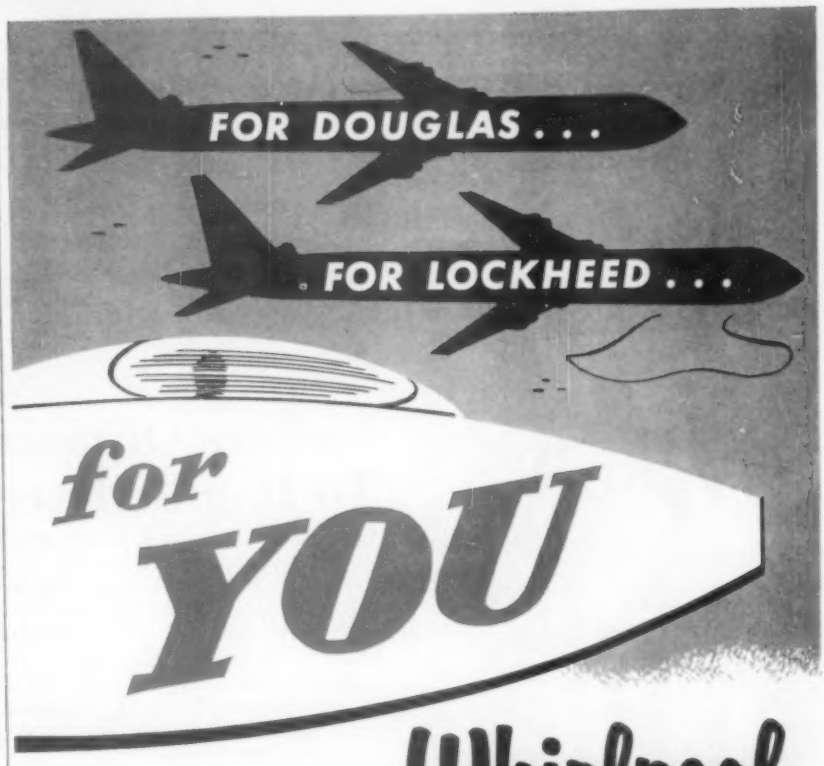
• **Glennite piezoelectric high-frequency vibrator AT-10A** handles vibrational resonance testing of electron tubes and enables technicians to calibrate accelerometers. Fundamental resonance frequency is 27 kc. and vibrator is resonant-free to that point. Stiff electromechanical design permits handling masses up to 3 oz. Sensitivity is reported to be 2.3 micro-inches per 55-v. output and acceleration range up to 0.5G at 1 kc. and 50G at 10 kc.

Address: Gulton Manufacturing Corp., Metuchen, N. J.

OFF THE LINE

United Air Lines is testing a high-intensity aircraft lighting system similar to the one tried out by Transocean Air Lines last year (AW, June 14, 1954, p. 80). Called "Madsen lights" (after pilot-inventor Capt. Andrew Madsen), the system is installed on a coach DC-6 and uses seven stroboscopic lights, mounted on top and bottom of fuselage. Bright lights flash 60 times a minute from tail forward to show plane's direction of flight.

KLM has come up with a new trick that adds 5 mph. to the speed of the airline's Super Constellations. Foam plastic fillets are applied to propeller trailing edges, flattening the round shape at the hub. This same fix also provides more effective cooling of the power plants.



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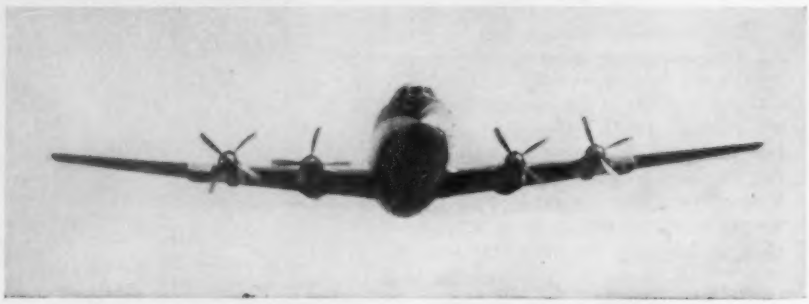

Vickers Organizes U.S. Firm To Handle Executive Viscounts

Vickers-Armstrongs, Ltd., has scored an important breakthrough in the U.S. corporation plane market and now has orders for more than a half-dozen executive versions of its turboprop-powered Viscount 700D.

U. S. Steel Corp. was the first to announce that it is getting Viscounts, with three scheduled for delivery next year (AW May 30, p. 93).

Vickers-Armstrongs' spokesmen in the U. S. say that they are sworn to secrecy regarding additional contracts, but indications are that some will be announced soon. One of these is another multiple order, probably two airplanes, AVIATION WEEK is told.

In preparation for what it calls "considerable interest" from the corporate market for its Executive Viscount, the airframe builder has formed a new company in the U. S., Vickers-Armstrongs, Inc., which will provide technical after-sales service and sell spare parts in the U. S. The new company is capitalized at $200,000, comprising 200,000 shares of common stock, all of it held by the parent firm.

Vickers-Armstrongs' warehouse in Alexandria, Va., established to handle Viscount spares for Capital Airlines, will fall under jurisdiction of the new company. Future plans include establishment of sub-depots in the U. S. when they are needed due to extension of Viscount operations. Indications are that Vickers will maintain a close grip on spares and does not plan to appoint distributors.

The new U. S. company's board includes T. Roy Jones, president of Daystrom, Inc.; John I. Snyder, board chairman and president of U. S. Industries, Inc.; George R. Edwards, managing director, aircraft, Vickers-Armstrongs, Ltd.; Ronald P. H. Yapp, a V-A director, and Christopher Clarkson, the airframe builder's U. S. representative since 1952. Vickers-Armstrongs, Inc., will maintain technical offices at 1523 L. St., N. W., Washington, D. C. Richard Botterill has been appointed as the organization's chief technical representative.

Clarkson has been touring the U. S., showing potential customers brochures detailing the Executive Viscount's features. Prospects are offered a "bare-hull" consisting of a standard Capital Airlines' cockpit with Bendix autopilot and Collins radio, long range "slipper" tanks in the leading edges of the wings and auxiliary fuel tanks in the belly in the pressurized portion of the fuselage. Basic price for this configuration is approximately $924,000, plus 15% import duty. However, customers can specify any cockpit layout or other equipment, with price then varying depending on their choice.

Planes can be delivered in 26 months, if orders are placed now, Vickers spokesmen say. The bare hull will be flown to the U. S. for installation of interiors by American conversion specialists to the customer's specs. This procedure saves the buyer 15% import duties on this phase of the airplane.

Addition of leading edge and belly tanks will give the Executive Viscount an ultimate still air range in standard air conditions of 2,875 statute miles, allowing climb to cruise at 25,000 ft. This is some 400 miles greater than standard airline Viscount 700Ds without belly tanks.

The plane's main wing tanks will hold 2,280 U. S. gal., slipper tanks 348 gal., and belly tanks 540 gal. At this fuel load, gross takeoff weight will be 63,000 lb., with disposable load 33,400 lb.

Powerplants are Rolls-Royce Dart Mk. 510s rated at 1,550 takeoff shaft horsepower each, plus 360 lb. of residual thrust.

The company points out that the airframe is capable of taking later, more powerful versions of the Dart with only minor modifications. Cruise speed with Mk. 510s will be approximately 320 mph.

MICRO SWITCH Precision Switches
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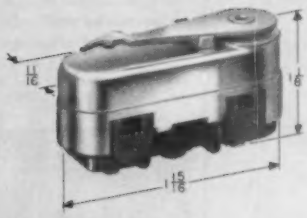

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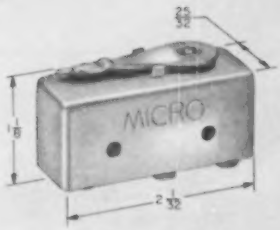

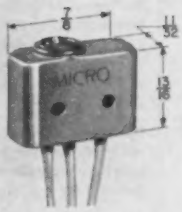

ENVIRONMENT-PROOF SUBMINIATURE SWITCH

These environment-proof precision switches are solving many exacting aircraft design problems

● MICRO SWITCH not only offers the most complete line of precise, dependable switches for aircraft applications, but gives a wide choice of hermetically sealed and environment-proof switches.

These MICRO SWITCH units vary in size, housings, mountings and other characteristics to provide aircraft designers with just the right switch for critical requirements.

Shown on this page are just a few of the precision switches developed by MICRO SWITCH engineering to meet specific aircraft design requirements. Whatever your switch need, it will pay you to consult with MICRO SWITCH engineering. For two decades the name "MICRO SWITCH, Freeport, Illinois" has been recognized as the stamp of precision switch quality

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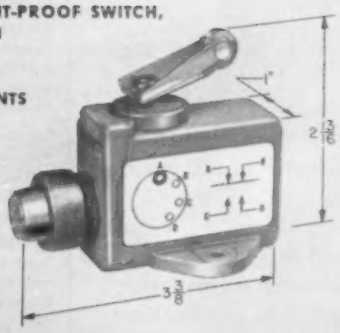
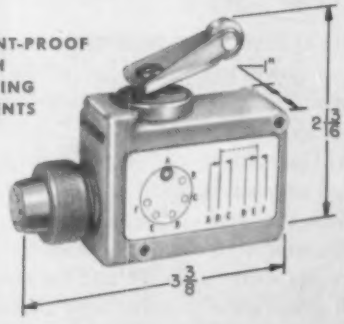


ENVIRONMENT-PROOF SWITCH WITH SIDE MOUNTING ARRANGEMENTS



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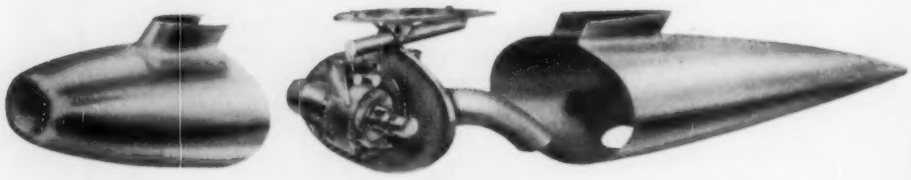

Solar research boosts altitude power output of gas turbine generator sets

FLYING ELECTRONIC TEST-BEDS need plenty of power in flight. So Solar "Mars" gas turbine auxiliary power units have been ordered for the Convair C-131B. Two APU's, each hung in a pod, will be installed on each plane.

With the Solar units, an ample and versatile supply of electricity is assured. The easily demountable gas turbine driven generators can both be direct current units, or both alternating current, or one of each can be installed. *As much as 30 kw d-c, or 40 kva a-c, can be supplied at 25,000 feet.* This high power output results from major design improvements in the proven Mars engine.

Mars gas turbine APU's are already specified equipment on the Douglas C-124C and the Lockheed C-121C. They have demonstrated their reliability and trouble-free service life by logging thousands of hours with only routine maintenance. Recently these Solar units were uprated from 500 hours to 750 hours between overhauls.

Light, compact Mars APU's can solve your airborne power needs. Write to Solar today for more information about these remarkable gas turbine generators!

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ENGINEERS WANTED. *Unlimited opportunities in Solar's expanding gas turbine program! Write today, giving your experience, to the address in the coupon.*

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When heat, corrosion or difficult specifications are problems, Solar can help you solve them. Solar specializes in the manufacture of precision products from alloys and special metals for severe service. Solar's experience since 1927 is unduplicated in this field.

SPECIAL PRODUCTS

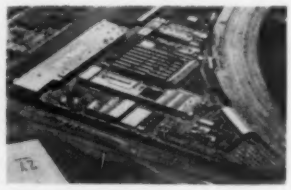
Gas Turbines. *Solar "Mars" 50 hp engines for auxiliary generator sets, ground carts, portable fire pumps; Solar "Jupiter" 500 hp engines in variable and constant speed models.*

Bellows. *"Sola-Flex"® bellows and expansion joints in many designs from ½ in up to the world's largest, 28 ft in diameter.*

Controls. *Complete control systems utilizing the new Solar "Microjet"® principle for control of gas turbines, jet engines and pneumatic devices.*

CONTRACT PRODUCTION

Current orders include aircraft engine and airframe parts, pneumatic ducting, atomic energy components. Customers include the finest aircraft and industrial companies in the U.S. and Europe.



Plants. *In San Diego (photograph above) and Des Moines. A total of 1,400,000 sq ft of floor space. Approximately 5,000 employees. Annual sales over $65,000,000.*

Services. *Research, design, development and production engineering staffs. Experienced with all alloy steels, stainless alloys, super alloys, and titanium and its alloys.*

Facilities . . . *for all types of metal fabrication—forming, machining, welding, brazing, casting, coating. Equipped for prototype, limited or mass production. Extensive laboratories. Complete quality control.*

INFORMATION

For more information regarding Solar Gas Turbines or any Solar product or service listed above, write Solar Aircraft Company Department B-25 San Diego 12, California

Bell 47 Hand-Crank Allows Higher Payload

Bell Aircraft Corp. has developed a hand-crank starter for its Model 47 copters to permit operators to take out more than 80 lb. of electrical accessories when greater payloads are required. The device will also permit one-man emergency starts in event of a power shortage where auxiliary sources are not available.

The Ft. Worth, Tex., helicopter manufacturer is including the hand crank as additional standard equipment on all Lycoming-powered Bells delivered after July.

Hand cranking the Lycoming is done by means of the otherwise unused generator drive with a 2.6:1 ratio with the crankshaft. A splined adapter is fitted to the drive spline, which has two notches to receive the hand crank. A gas tank cap protects crank port.

When an increase in payload is needed, the operator can remove the battery, starter, 50-amp. generator, voltage regulator, cordage and attachments for a total saving of 80 lb. A single lightweight dry cell is then installed to operate instruments.

The starter was developed by the company following utilization reports from agricultural, mapping, construction and other users indicating that numerous stops made it desirable to have an emergency starting system. Experience during the Korean War also showed that engine starts sometimes had to be made in the field using borrowed power from ground vehicles.

PRIVATE LINES

Deliberate wheels-up landing was made at Westchester County Airport, N. Y., by Cessna 180 fitted with new Edo amphibious floats as part of tests required by Civil Aeronautics Administration for float approval. Plane was then jacked up, wheels lowered and a normal takeoff and landing was made. Edo is working on an initial production run of 50 sets of the new floats at College Point, L. I., N. Y.

Top speed of 124 mph. and minimum speed of 43 mph. has been recorded for the new AG-3 spray/dust plane over a three-mile course, reports designer Fred E. Weick, Director of Personal Aircraft Research Center, Texas A&M, College Station. Distance to takeoff and climb to 50 ft. with 800 lb. in the hopper and one-hour's fuel from sea level with no wind, is reported as 920 ft.

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Cross-section designs are accurately formed during the rolling of Edgewater weldless steel rings, so that usually very little subsequent machining is needed. This reduces manufacturing cost, and saves material. Diameters, 5 inches to 180 inches.

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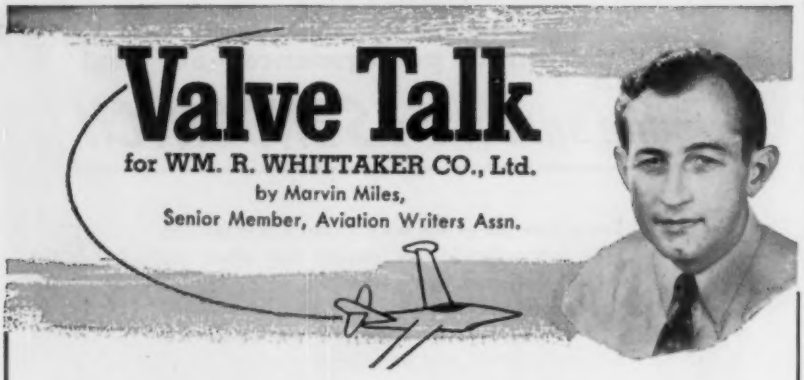
Unconditional Guarantee! Write for details. RALPH C. ROBINSON CO., Box 494B, North Sacramento 15, Calif.

(Advertisement)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.



Some years ago a tanned young man in Levis, cowboy boots and an open shirt appeared at the Whittaker Company's reception lobby, a blackened, greasy valve in his hands.

"This here's one of your valves," he told the somewhat startled red-haired receptionist. "It won't work any more and I want it fixed."

The girl called a field engineer who took one look at the inch-and-a-quarter gate valve and asked incredulously:

"What on earth have you been running through it?"

"I don't know — most everything, I guess," the young man answered amiably. "You see, I'm a crop duster... work on my own... and I use this here valve between the tanks and the spray nozzles so I can shut the 'goop' off real fast when I need to.

"Got the valve from a surplus outfit, but the darned thing only lasted about fifteen hours before she quit cold. Figure you can fix her up for me? Got a lot of sprayin' to do and the fields won't wait long."

This incident founded Whittaker's "Insecticide Division."

Company engineers saw immediately the importance of agricultural flying. And they foresaw, too, the growth of spraying and dusting operations as a service vital to the nation's farms and forests.

Besides, the challenge was intriguing and there was research value in the study of valves that had been subjected to a range of fluids far rougher than fuel, oil, alcohol and water.

The condition of the first "cropdusting valve" (a standard gate valve) offered to Whittaker for repair was appalling. Cleaned up and disassembled, it proved to be filled with hydrocarbons and other matter that had been suspended in the various insecticide mixtures. These solids had clung to the valve's components, hardening to the consistency of concrete, finally blocking operation of the unit entirely.

The valve was rebuilt without benefit of blue prints as rapidly as possible at a nominal fee, and the duster went happily back to his plane and his crop-hopping schedule.

Word of Whittaker's cooperation spread from pilot to pilot, and soon other dusters began appearing with valve troubles wrought by a wide variety of uses for which the units were not intended.

In one instance, it was discovered that rubber "O" rings had swelled to twice their normal size in the flow of DDT compound and acetone carriers, gumming up the works to the point where the slide grabbed and burned out the motor. Teflon seals were substituted and were found to be ideal for this mixture.

In each instance speed has been a factor in the repair jobs done for agricultural pilots. Troubles naturally occur in the midst of a spraying schedule when the rapid growth of insects leaves little time for insecticide application.

The dusters must always have dependable valves to assure instantaneous operations, since they frequently spray one crop with a certain chemical that might be injurious to an adjacent crop — possibly a field planted by another farmer. The spray shut-off must be perfectly timed, too, as well as fast and sure.

In all, Whittaker has modified some 300 valves for these plant-buzzing jockeys, in each case giving the units special treatment at standard prices. Obviously, there's no profit in the chore, and the total amount of crop dusting business isn't a drop in the proverbial bucket.

Yet the company is anxious to help these hard-working pilots in their vital role of saving crops and protecting trees, and appreciates that an activity of such importance to the country should be given a lift wherever possible.

In some cases it has sold new valves, rather than modify surplus units, and in others it has turned over parts and instructions so the flyers themselves can make the modifications. In each case the operations life of a flying spray system has been lengthened materially.

A stack of letters from individual pilots, crop dusting concerns and the Federal Bureau of Entomology, too, tells of appreciation for these efforts which have become more or less a hobby with the valve concern.

When you receive a letter that begins: "We realize you have gone out of your way to help us in every manner possible..." it makes the effort worthwhile.

AVIATION CALENDAR

June 9-14—Sixth All-Women's International Air Race, Washington, D. C., to Havana, Cuba.

June 10-19—Twenty-first International Aviation Display, LeBourget Field, Paris, France.

June 12-17—Society of Automotive Engineers, Golden Anniversary meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

June 12-19—Pennsylvania Pilots Council, Pilot's Proficiency Contest, Graham Field, Butler, Pa.

June 13-14—Women's Aeronautical Assn., annual Skylady Derby, Little Rock, Ark., to Raton, N. M.

June 13-14—Formal course on Boundary-Layer Control, University of Wichita, Wichita, Kan.

June 16-18—American Society of Mechanical Engineers, 19th National Applied Mechanics Conference, including sessions on aeronautical and guided missile research, Rensselaer Polytechnic Institute, Troy, N. Y.

June 17-24—Federation Aeronautique Internationale, 50th Anniversary Conference, Paris.

June 18-25—Philadelphia Junior Chamber of Commerce, third annual Transcontinental Air Cruise, Palm Springs, Calif., to Philadelphia.

June 19-23—American Rocket Society, semi-annual meeting, Hotel Statler, Boston.

June 19-24—American Society of Mechanical Engineers, semi-annual meeting, with five aviation sessions, Hotel Statler, Boston.

June 20-23—Institute of the Aeronautical sciences and the Royal Aeronautical Society of Great Britain, fifth international Aeronautical Conference, IAS Building, Los Angeles.

June 20-25—Symposium on Electromagnetic Wave Theory, University of Michigan, Ann Arbor, Mich.

June 20-July 1—Special short course on Parachute Technology, Massachusetts Institute of Technology, Cambridge.

June 22-24—Aviation Distributors & Manufacturers Assn., Silver Anniversary meeting, Breezy Point Lodge, Brainerd, Minn.

June 23-25—1955 Heat Transfer & Fluid Mechanics Institute, University of California, Los Angeles.

June 23-25—Institute of Navigation, 11th annual meeting, Maxwell AFB, Montgomery, Ala.

June 27-July 1—American Society for Testing Materials, 58th annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

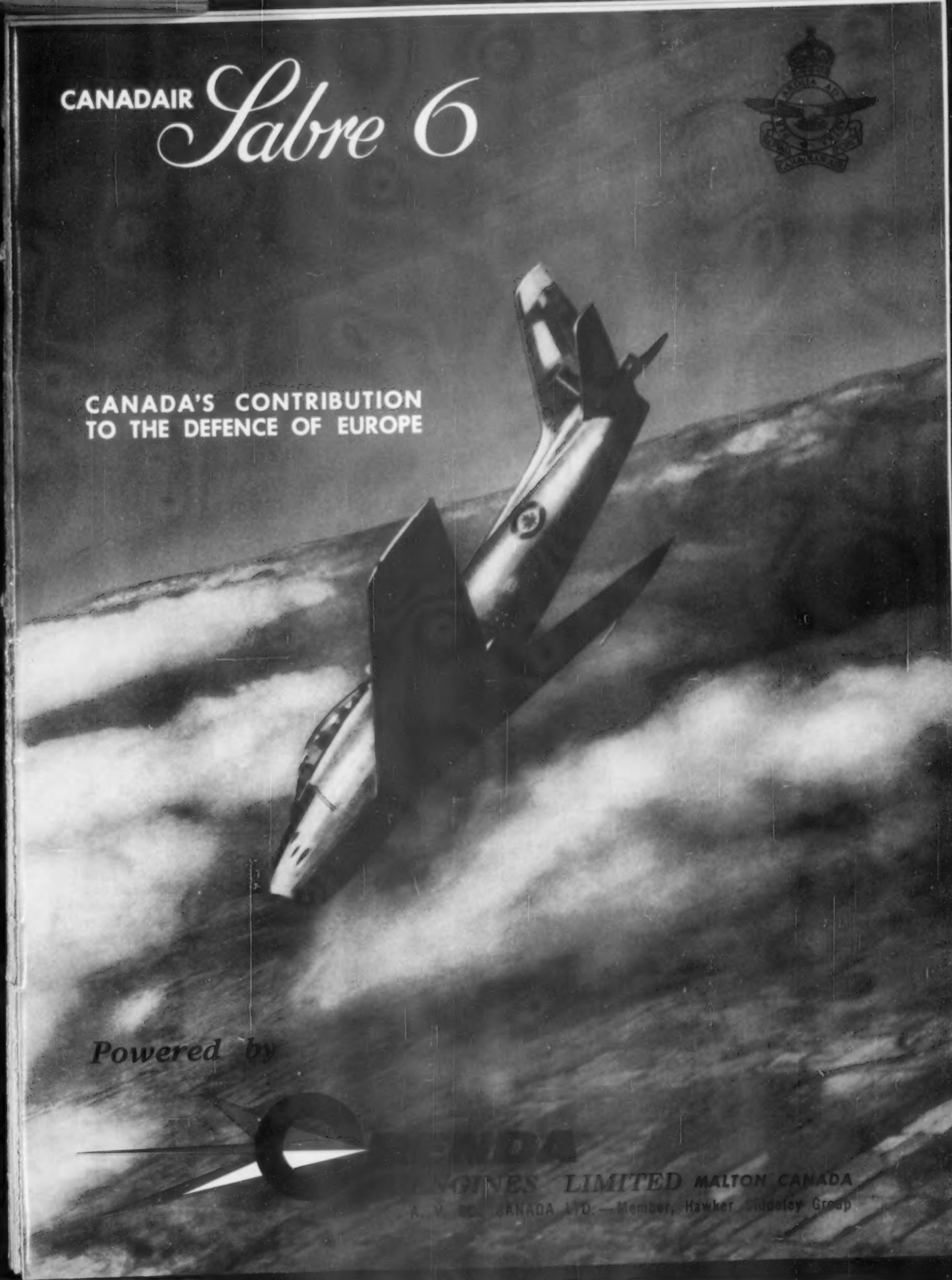
July 2—Air Force Assn., second annual Earl T. Ricks Memorial Trophy competition for Air National Guard jet pilots, Los Angeles to Detroit.

July 2-3—Second annual Western New York Air Show and Races, Dansville Airport, Dansville, N. Y.

July 2-4—International Aviation Exposition, Detroit.

July 2-14—Twenty-second National Soaring Contest, Harris Hill, Elmira, N. Y.

July 12-14—Western Plant Maintenance and Engineering Show, produced by Clapp and Poliak, Pan Pacific Auditorium, San Francisco.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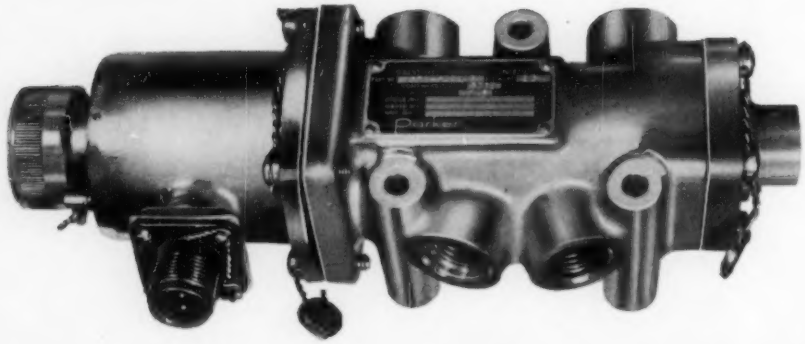

When Lockheed Aircraft engineers called Parker, they wanted action: Lockheed had designed a new hydraulic system to give more positive control over the power operated elevator trim tabs on the P2V-Neptune. As a result of the new design they had a requirement for a 4-port valve which was not available from any supplier.

In 18 days of intensive, day and night application and working so closely with Lockheed they were practically an extension of the Lockheed Engineering Staff, a Parker team from the Hydraulic Division delivered the first units. In this short time they had designed the new valve with a new solenoid, made castings, and started production. The system was installed in an aircraft and found so satisfactory that it was subsequently installed in earlier P2V models as well as current production.

The new system employs two valves per plane. They are direct solenoid operated, non-interflow type, with a normal operating pressure of 3000 PSI. Internal leakage is 5cc. maximum in any position and the maximum pressure drop is 100 PSI at 4 GPM at 90° F. Actuating time to energized position is 0.1 seconds maximum and to normal position is 0.5 seconds maximum. The solenoid is continuous duty type with a maximum current drain of 1.5 amperes.

The Parker team method of intensive application is available to you for all problems involving aircraft fuel valves, hydraulic valves, check valves and related components. If you have a problem in one of these fields or are beginning system design, get a Parker team on your staff.

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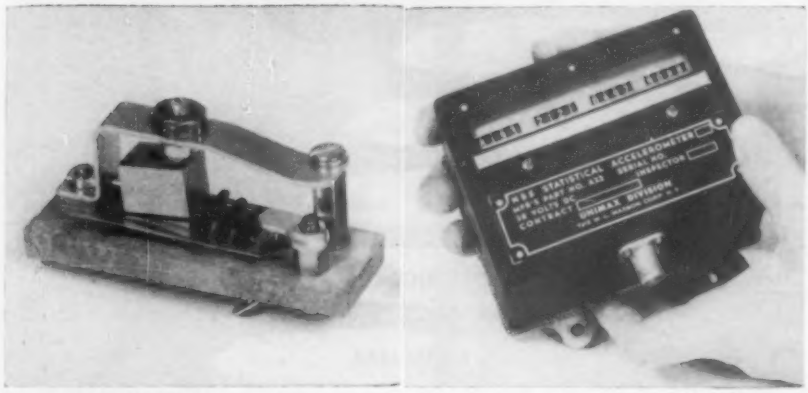
NEW AVIATION PRODUCTS



SNAP-ACTION SPRING unit (left) with adjustable mass fits into box containing counters.

G-Counter Helps Predict Fatigue Failure

A statistical accelerometer, designed to help forecast airframe failures, is being manufactured by the Unimax Division, W. L. Maxson Corp. Development was carried out by Unimax in cooperation with the National Bureau of Standards and under Bureau of Aeronautics sponsorship.

If the number of times an aircraft structure is subjected to a known, cumulative series of G stresses can be accurately determined, the fatigue failure of the structure can be foretold, according to Miner's theory of cumulative damage. The statistical accelerometer tells the researcher how many times a particular G-stress has been applied.

The instrument incorporates four, 4-digit, electromagnetic counters, which may be adjusted to register any desired G value from 2 to 10. Counters are actuated by Unimax snap-action sensing elements which contain an adjustable mass mounted on a leaf spring. Switch is pre-set to register desired G value on a horizontal centrifuge.

Electrical circuitry of the accelerometer allows the unit to record only significant Gs, and ignore small excursions of acceleration. Each counter records the number of times the aircraft is subjected to the G value which it is set to record. A balanced rotary armature prevents miscounts due to shock, vibration or acceleration.

The accelerometer requires no paper, film or other operating supplies. Its record is always visible and it requires neither processing nor data reduction. The instrument was designed for low maintenance, high reliability and faithful recording of all maneuver and gust loads.

It operates on 28-v.d.c. and counters draw 100 milliamperes each. Size of the unit is 5¼x3⅞x3 in.; weight is 2 lb., 3 oz.

Punch Press for Wiring Boards

Printed wiring boards can be pierced at nominal rates of 80-120 holes per minute using new RA-4P turret punch press. Holes up to 1¼-in. diameter are punched.

In operation the press trips automatically when the hole locator is depressed so that it is engaged in a template hole. Engaging a foot switch swings the next color-coded tool into place. Thermostatically controlled heating element in the table maintains desired punch temperature in preheated laminated boards, the maker notes.

Wiedemann Machine Co., 4272 Wissahickon Ave., Dept. 20, Philadelphia 32, Pa.

Latch for Electronic Chassis

Electronic chassis panel latch 21L not only provides leverage to open or close drawers, but the handles also can be used for carrying the item, the maker says. Six-pound maximum load disengages the handle lock. Maximum horizontal working load is 400 lb., ultimate load is 600 lb.

Locking mechanism is designed to give a vibration-proof seal when closed. Latch sizes accommodate a minimum panel size of 4 in.

Camloc Fastener Corp., 55 Spring Valley Rd., Paramus, N. J.

Liquid Sensor for Fuel Systems

Liquid-sensing unit detects presence of liquid in 0.4 sec. and absence of liquid in 5 sec., and has applications in fuel systems as a low-level warning indicator or as a high-level cutoff switch when tanks are being filled. A version is being developed that will operate in fuming nitric acid, the manufacturer reports.

An electrically powered probe containing a small thermistor, a compact power-control package and an interconnecting cable make up the unit. Multiple probe types are available for sequencing automatic operations.

Unit is stated to be operable from −319F to +200F, has no moving parts and is not subject to wear, clogging, corrosion, vibration or shock.

Air Associates, Inc., Teterboro, N. J.

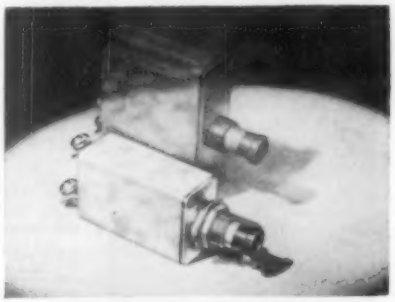
Long Parts Heat-Treated

Specially designed by Loftus Engineering Co. to vertically heat-treat extra-long parts, Vertical 752 furnace has been certified by U. S. Air Force for hardening, annealing, stress relieving and normalizing steel and aluminum, the manufacturer reports.

Unit is carriage-mounted and moves on tracks over a 25-ft.-deep and 60-ft.-long pit housing three agitator-type quench tanks containing water, oil or hot salt. It has been found that the hot salt quench reduces distortion up to 90% compared with conventional oil quench, the maker states.

Furnace working space is 9.5 ft. wide and 22 ft. high. A self-contained crane is in a gastight housing.

Metallurgical, Inc., Minneapolis 14, Minn.



Small Circuit Breakers

Miniature trip-free Klixon D6761 aircraft circuit breaker has high rupture capacity and has handled over 2,000-amp., 120-v., 400-cps. a.c., and 6,000-amp., 10-v. d.c., the manufacturer states. Breaker is designed to meet operational requirements of MIL-C-5809.

Two of these units can fit into the same mounting space as one MS type breaker, it is reported. Breaker is available in ratings from 5 to 35 amp.

Spencer Thermostat Division, Metals & Controls Corp., Attleboro, Mass.

Avionic Test Chamber

Temperature test chamber for electronic equipment has a range of −100F to 200F and automatically cycles tem-

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perature from —40F to 185F in 15 min.

Same unit can be adjusted to cycle temperatures in accordance with all government specs, the manufacturer says. Inside chamber dimensions: 12x 12x24 in.

Webber Manufacturing Co., Inc., Dept. 3a, 2470 Madison Ave., Indianapolis, Ind.

ALSO ON THE MARKET

Magnetic conveyors to transport ferrous pieces up inclines of 90 deg. or less, also automatically stack flat parts and feed machines, the manufacturer states.—Homer Manufacturing Co., Inc., Dept. 262, Lima, Ohio.

Soft soldering flux kit contains 16 varieties for printed circuit, electronics and general purposes. Price $6.50—Alpha Metals, Inc., 56 Water St., Jersey City 4, N. J.

Improved Turco-Solv, for cleaning electrical equipment, has a flash point over 200 F, TCC. Dries without residues. —Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif.

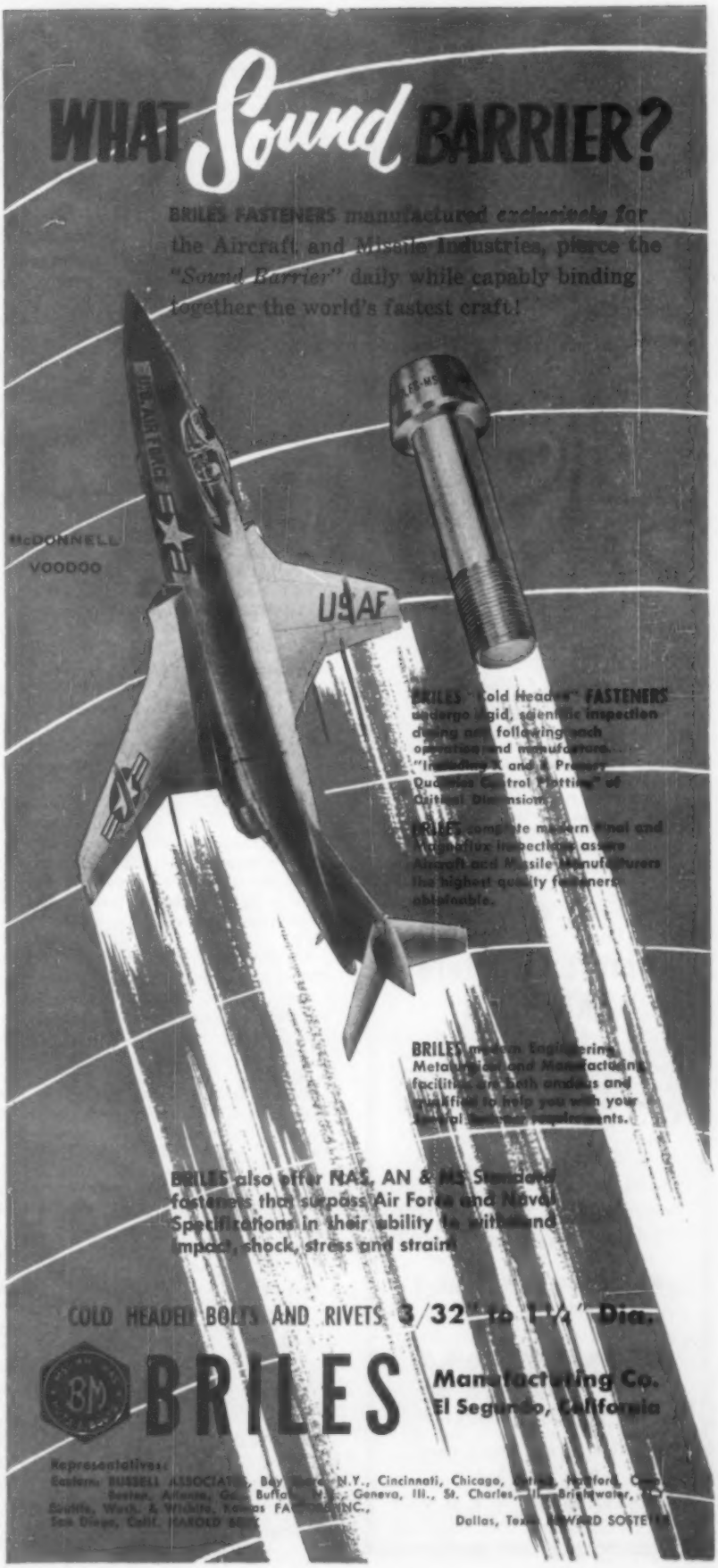
Sulfamate nickel plating process gives coating hardness up to 50 Rockwell C and tensile strength to 160,000 psi., the maker states.—Barrett Chemical Products Co., Shelton, Conn.

Laqua metal coating preserves chemically clean surfaces obtained after electroplating or chemical cleaning. Product has withstood 210 hr. American Society for Testing Metals salt spray test, maker reports.—Fidelity Chemical Products Corp., 470-474 Frelinghuysen Ave., Newark, N. J.

Hydra Spring with built-in valve for dampened return to cushion impact produces up to 3,600 lb. force at one-inch stroke. Unit is 4¾-in. long, including stroke, x 2¾-in. diameter.—Hydra Spring Division, Wales-Strippit Corp., 345 Payne Ave., N. Tonawanda, N. Y.

Type J20 absolute pressure control for pressurizing pumps or other equipment, uses a completely evacuated bellows, providing positive switching independent of atmospheric pressures and temperatures.—United Electric Controls Co., 85 School St., Watertown, Mass.

Spotcheck dye penetrant, an inspection fluid, is now available in pressurized cans for easy application. Complete penetrant, developer and cleaner kit costs $35.—Magnaflux Corp., 7321 Ainslie Ave., Chicago 31, Ill.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Graduate Engineer with sufficient flying experience to participate in development & flight test of new ideas in the field of automatic controls, flight instruments & instrumentation. Bachelors degree in Engineering required: MS or PhD preferred. Minimum of 2,500 hours first pilot time; comml multi-engine land, single engine land and instrument rating essential. ATR, rotary wing & jet exp desirable.

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AVIATION SAFETY

CAB Report on Petroleum Helicopters' S-55 Crash

Low Fog Causes Loss of Control

THE ACCIDENT

A Sikorsky helicopter, model S-55, N 737A, owned and operated by Petroleum Helicopters, Inc., crashed approximately 200 yards offshore in the Gulf of Mexico near Grand Isle, La., Dec. 2, 1954. The accident occurred at approximately 0235[1] during an attempt to land in heavy fog. Four of the five passengers perished as a result of injuries or drowning; one passenger and the crew of two received minor injuries. The aircraft was demolished by impact and fire that followed.

HISTORY OF THE FLIGHT

N 737A departed the Grand Isle heliport at 0115 for the purpose of transporting oil drilling employes (who were working under a contract between Delta Gulf Drilling Co. and the Humble Oil and Refining Co.) to Grand Isle from an oil drilling rig located approximately six miles offshore. The crew consisted of Alvin D. Allen, pilot, and Richard F. Bickwell, co-pilot.

After reaching the drilling rig, designated ST-6, a normal landing was made on a helicopter landing platform constructed on the deck of an LST anchored adjacent to the drilling rig. A normal waiting period took place for a shift change and the five returning employe-passengers to board the helicopter. At 0218 the flight departed for the Grand Isle heliport, a flight which normally required approximately 10 minutes. The flight took off on a west heading and made a right 90-degree turn toward the nearest shoreline, climbing to 1,000 feet m.s.l.

At departure, lights located on other offshore rigs and on shore, varying between 6 and 10 miles away, were clearly visible but with a slight halo attributed to haze. This condition had existed throughout the entire night operation consisting of several other flights.

As the flight proceeded toward the shore vertical visibility steadily and rapidly decreased. Shore lights, dimly visible, were recognized and the flight turned right following the shoreline eastward toward the heliport. After reaching the landing area the hangar lights and a continuously burning oil residue flare (a shallow pit 15 feet in diameter burning oil. tar, and gas seepage), also located near the heliport, were visible only as a glow through the fog from an altitude of 500 to 600 feet.

The flight passed over the heliport hangar and glow of the flare and made a 180-degree left turn. A letdown was started but during the descent visibility became worse and visual reference with the lights was lost. A pull-up was then executed to about 450 feet, which was the top of the fog layer.

An attempt to land, at the co-pilot's suggestion, on an unobstructed clearing near the hangar was abandoned when the hangar lights could no longer be seen and a second pull-up was made. At this time the pilot could no longer see lights in the area of the various offshore rigs. At 0232, immediately after this pull-up, the fuel warning light came on indicating 30 min. (about 20 gal.) of remaining fuel.

The pilot then decided to land on the clearing near the flare by approaching the flare from the east and using it as a ground reference through the fog. The helicopter was flown to the east of the area and a descent was started toward the flare with approximately 40 knots forward speed. The approach seemed normal until the pilot realized he was overshooting the flare. At this time considerable glare was reflected in the cockpit.

The pilot asked the co-pilot to take over on the controls. Co-pilot Bicknell applied full power, noting an exaggerated nose-down but laterally level attitude on the pilot's gyro horizon instrument and that the altimeter was then indicating about 250 feet. Only a few seconds thereafter the aircraft struck the water.

Both crew members and one passenger were able to extricate themselves from the wreckage before fire started and spread to gasoline and oil on the surface of the water. Fire prevented them from approaching the wreckage to help the others and they swam to shore, guided by a light dimly visible through the fog.

INVESTIGATION

Most of the wreckage of the helicopter was recovered from the Gulf. Examination revealed that at the time of impact the aircraft was nearly level both fore-and-aft and laterally, and was descending toward the water at an angle of approximately 35 degrees. Impact forces were severe in an upward and rearward direction. The fuselage was moderately telescoped and was broken off at station 206 located at the rear of the passenger cabin. The tail boom, together with the tail rotor and its shaft, remained generally intact.

As a result of impact, wave action, and salvage operations the cabin and cockpit areas were nearly destroyed above the level of the passenger cabin floor. The entire wreckage revealed evidence of impact and fire damage; however, there was no evidence found of structural failure or fire damage prior to impact. Although the weight and balance manifests aboard the aircraft were lost, load computation and the seating arrangement indicated that the aircraft was loaded to a gross weight well under the maximum allowable of 7,200 lb. and that the load was properly distributed in relation to the center of gravity of the aircraft.

Examination of the powerplant and statements of the crew disclosed that no malfunction nor loss of power was experienced

[1] All times herein are central standard and are based on the 24-hour clock.

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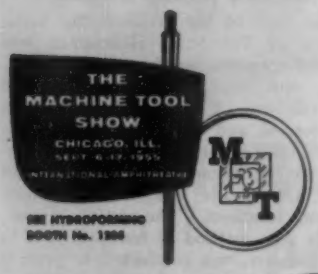
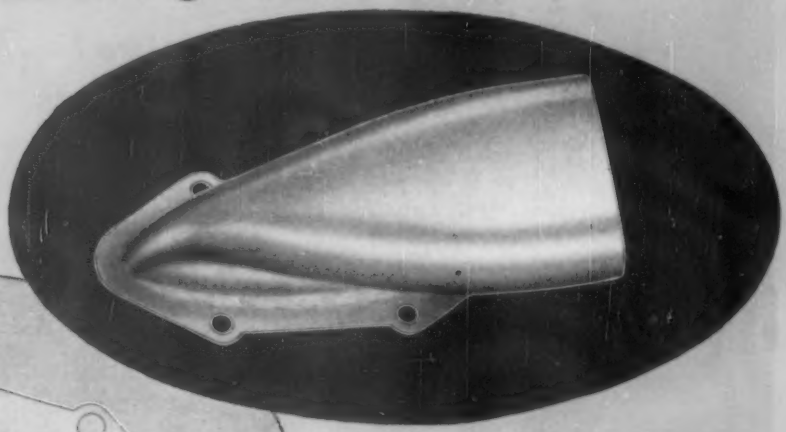
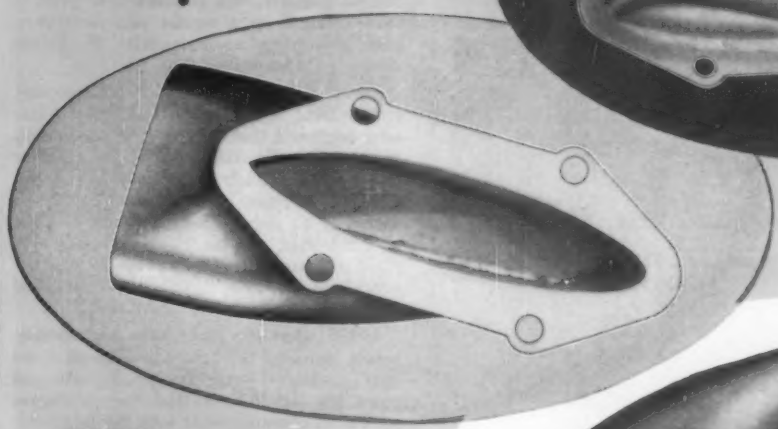
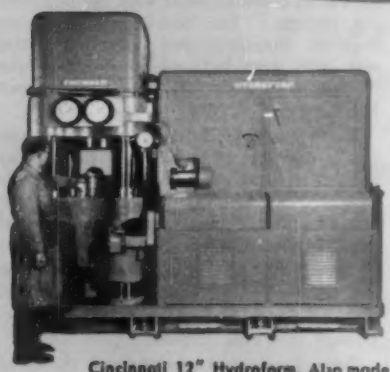






Two views of a jet engine component produced from the Hydroformed blank shown in the photo below. Material is 0.048" Chromaloy. Part length is 5¾".



Cincinnati 12" Hydroform. Also made in 8", 19", 23", 26", and 32" sizes.

was Hydroforming

The manufacturer who contracted to supply this jet engine component certainly got the job off to a good start. It was well planned throughout. The finished shape was to be obtained by drawing a blank of 0.048" Chromaloy to the required contours so that by cutting the part lengthwise, a right-hand and left-hand section would be produced. The sections, plus a stamped flange, were to be assembled by welding.

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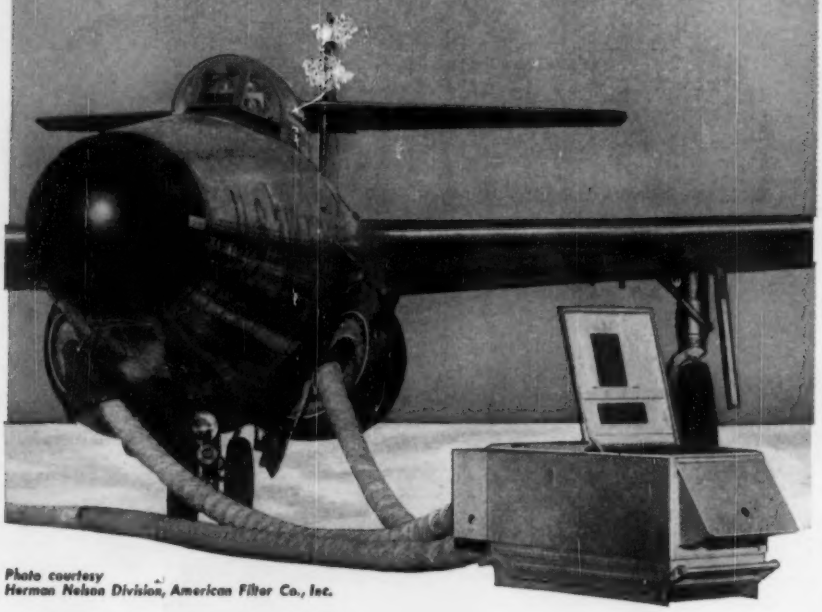

Photo courtesy
Herman Nelson Division, American Filter Co., Inc.

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before impact and that all controls and instruments were functioning in a normal manner. The engine, a Pratt and Whitney R1340, had been properly maintained.

At the time of the accident the flying operations of Petroleum Helicopters was varied and extensive in the United States, Panama, and South America. In the Grand Isle area it was a transportation service for oil and oil well drilling companies. The operation was confined to transporting personnel very short distances between Grand Isle and several offshore oil drilling locations. The service, a comparatively new method of transportation in the oil industry, was conducted to provide transportation on a regular and emergency basis, involving approximately 45 flights during a 24-hour period.

Investigations disclosed that the company employment standards for helicopter pilots were high and that training and supervision were continually conducted by the chief or assistant chief pilots to insure a safe operation. Company policy gave the pilot authority to discontinue or cancel a flight if conditions, in his opinion, made the flight inadvisable. The minimum weather conditions for VFR flights were established at ceiling 300 feet and visibility ½ mile.

Other operating procedures and requirements provided that the acting co-pilot see that passengers were equipped with and wore life jackets and that the passengers took seats commensurate with the best loading pattern. The co-pilot also prepared required manifests and ascertained that seat belts were fastened before the flight. According to testimony these requirements had been met before the subject flight.

Refueling procedures used in the company's operation required that the helicopters be serviced with sufficient fuel for the next scheduled round trip flight in addition to a minimum of 30 min. reserve fuel. Investigation revealed that the aircraft was so refueled prior to the subject flight; also, fire damage to the wreckage indicated that a considerable amount of gasoline and oil burned following impact.

Several witnesses substantiated the crew's statements that prior to the time of takeoff they could see shore lights and other offshore drilling rig lights which varied between 6 and 10 miles away. Stars were clearly visible. Witnesses offshore and at the heliport stated that at both locations fog formed very quickly soon after the flight departed.

Both crew members of the subject flight were well qualified and had received regular checks on company operating and emergency procedures for helicopters. Both also were first pilots and during daylight hours flew alone. At night, however, as a safety measure two pilots were required to operate the S-55 and the pilots traded the flight commander's position every other flight. Communications equipment installed in the aircraft, at the Grand Isle heliport, and at each offshore terminal provided continuous contact between the aircraft and any terminal on one fixed radio frequency. Operating procedures gave aircraft transmissions priority over any other messages.

At the present time helicopter flight

characteristics have made instrument flight

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characteristics have made instrument flight difficult under certain conditions, especially during the approach and landing configurations where low speeds are necessary. Although great progress has been made, the S-55 helicopter and others have not yet been certificated for commercial instrument operations. Therefore, Petroleum Helicopters did not intend that flights be made unless continuous visual ground reference could be maintained.

The weather conditions which existed at the time of the accident consisted of a cold front which extended east and west through northern Louisiana and which was moving slowly south until at 0030 on Dec. 2 it was about 50 or 60 miles north of Grand Isle. The front separated a relatively dry polar marine air mass to the north and a moist tropical stable air mass to the south. Characteristic of the season, the inland water was colder than the Gulf water and night radiation cooled the land surfaces rapidly. As a result, the air near the surface was cooled to the dewpoint, whereas less cooling occurred in the Gulf water. These factors, coupled with the stable air mass and light surface wind, produced fog along the land and the inland and coastal waters in the Grand Isle area ahead of the front.

Investigation disclosed that Petroleum Helicopters had no arrangements for obtaining aviation forecasts or advisories for their operation, nor were there any official weather observations available to them for the immediate Grand Isle area. The Humble Oil Co., however, had a contract with a commercial weather service located in New Orleans for obtaining marine weather information and forecasts twice daily, at 0630 and 1530. These advisories and forecasts were received by telephone and immediately made available to the helicopter company, and were posted in flight operations for the pilots. The commercial weather service also provided special weather information when they considered it pertinent.

The crew of N 737A stated that on the day of the accident they read the weather bulletins which indicated the possibility of patchy inland fog during the evening hours of December 1 and early morning hours of Dec. 2. They also stated that because of the forecast they were especially observant of the haze condition prior to takeoff.

ANALYSIS

The fog which the flight encountered was undoubtedly variable in intensity and thickness and was drifted by the light northwest wind flow. It appears that the fog at Grand Isle formed in a light degree before the flight left ST-6 and that denser fog formed and moved in very rapidly during the flight. This situation and the accident that resulted showed the need for more frequent, more adequate, and detailed weather forecasts and advisories in Petroleum Helicopters' operation.

The rapid formation of fog also vividly pointed out the need for some observation equipment to be located at Grand Isle so that conditions there can be constantly observed and indicated changes immediately recognized[3] (see footnote p. 110).

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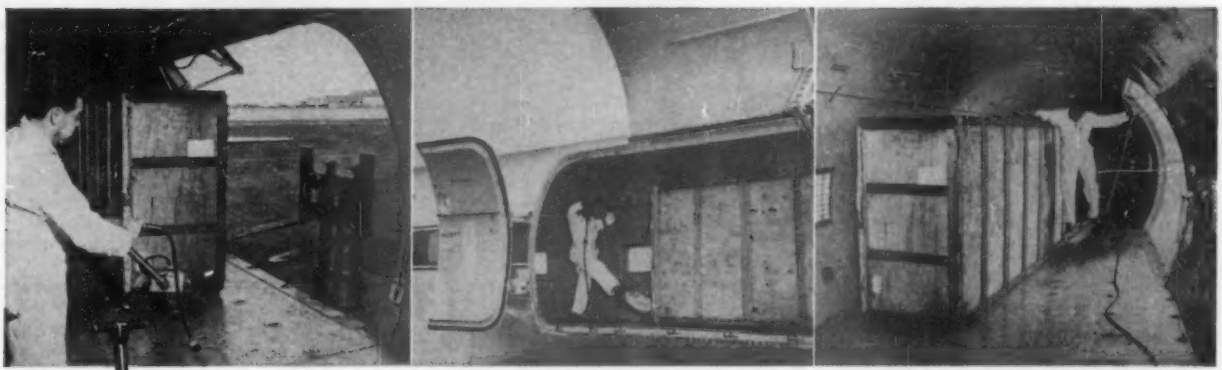

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area the crew found it covered by ground fog. (Flight characteristics and instrumentation thus far developed have not been adequate for helicopter instrument approaches and landings.) The situation therefore was an emergency for the crew of N 737A.

Additionally, remaining fuel, although adequate for the company's normal operation, was insufficient for an extensive continuation of the flight. It is believed that in the emergency the crew should have called ST-6 by radio to make a positive determination as to whether or not the fog was existent there also. However, evidence indicates that shortly after departure fog did reach that position and within the time required to make the return flight it would have been fog bound.

During the pilot's attempt to make a visual landing near the oil flare it is believed that he began to lose visual reference with respect to the attitude and position of the aircraft during the descent into the fog. As the aircraft passed over and beyond the flare the condition was aggravated by reflected glare and immediate darkness which followed. At this moment, without visual reference, the pilot lost control of the aircraft.

FINDINGS

On the basis of all available evidence the Board finds that:

1. The aircraft and crew were properly and currently certificated.
2. The aircraft was loaded to a weight well below the maximum allowable and the load was properly distributed in relation to the center of gravity of the aircraft.
3. At departure from ST-6 lights were visible between 6 and 10 miles away but with haze which had existed during the entire evening operation.
4. During the flight fog developed rapidly over the area from the surface to about 450 feet above the surface.
5. The S-55 type helicopter has not been approved for instrument flight.
6. Lack of weather equipment prevented timely anticipation of the fog.
7. There was no power or structural failure or other malfunction of the aircraft prior to impact.

PROBABLE CAUSE

The Board determines that the probable cause of this accident was the loss of visual reference caused by fog and glare, which resulted in a loss of control by the pilot during an attempt to land.

By the Civil Aeronautics Board:

Ross Rizley
Joseph P. Adams
Josh Lee
Chan Gurney
Harmar D. Denny

[2] During the public hearing it was learned that Petroleum Helicopters Inc., has ordered meteorological equipment for measuring wind direction and velocity, temperature, dewpoint, and barometric pressure. This equipment will provide some on-the-spot weather information in the Grand Isle area and especially aid in determination of conditions under which fog may result. The company will also obtain radio equipment so that it may receive CAA aviation weather broadcasts from New Orleans, which will be utilized in their offshore operations. They will install a TWX circuit from Lafayette for receiving forecasts and other information from CAA schedule "A" circuit.

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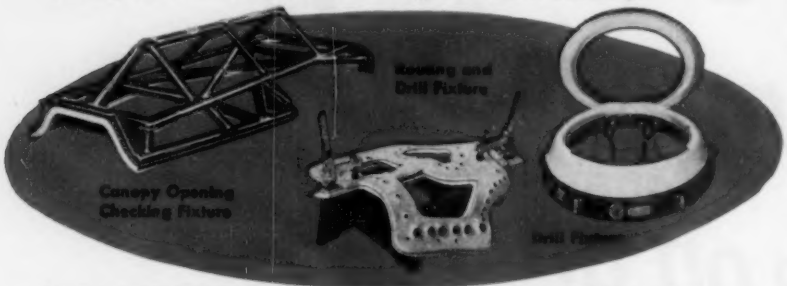

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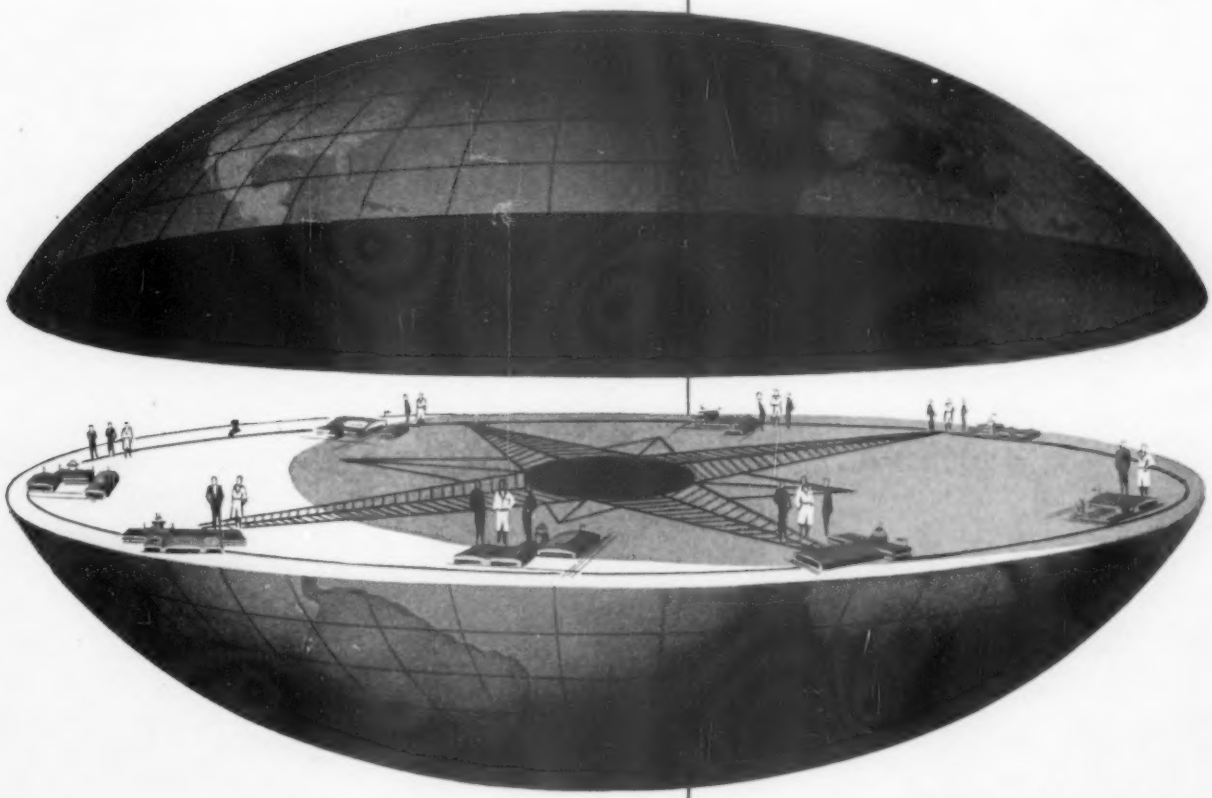

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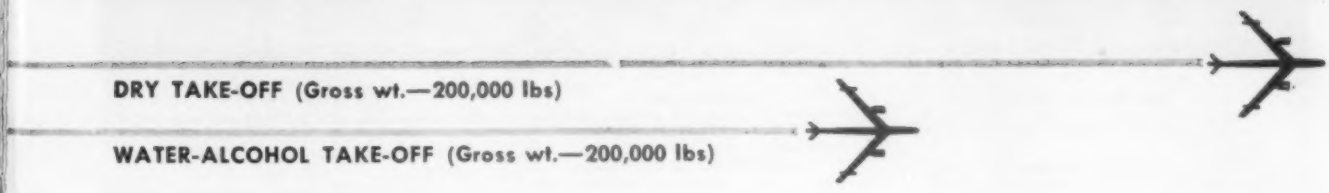

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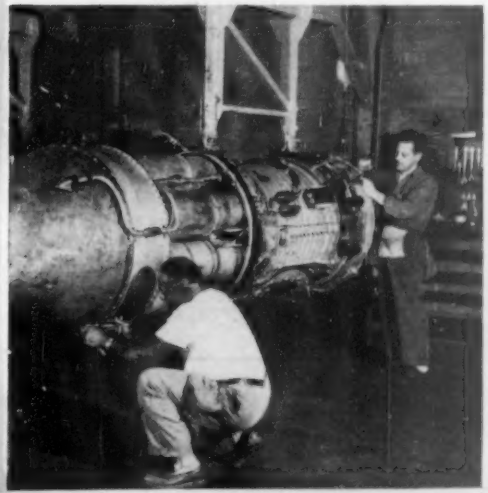

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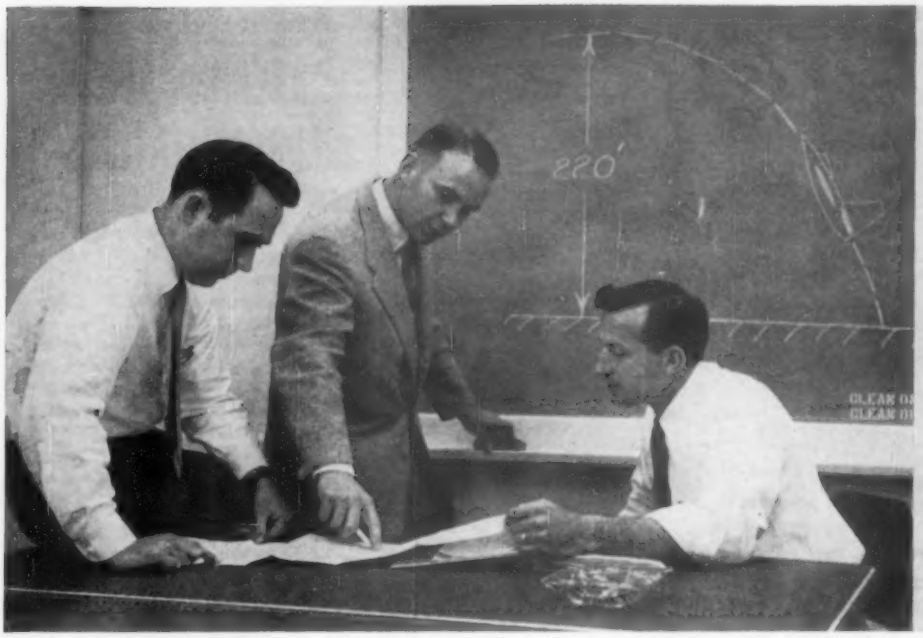

N. T. Avant, aerodynamicist (left), R. R. Heppe, Aerodynamic Department head (center), and C. F. Branson, aerodynamicist, discuss wind tunnel tests to determine transition height of a supersonic superiority fighter.

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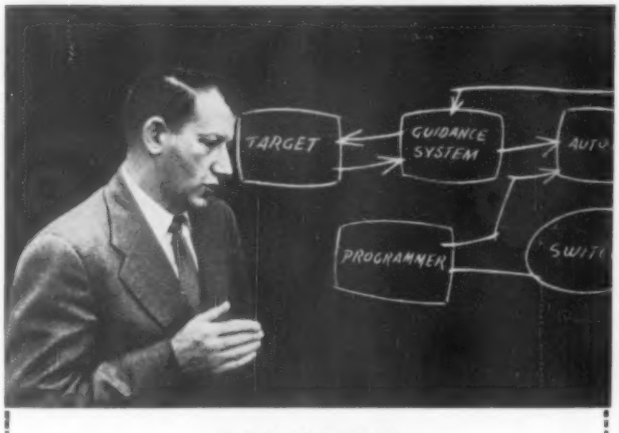

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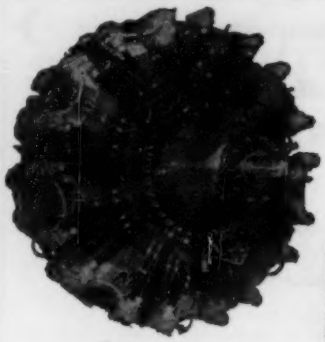

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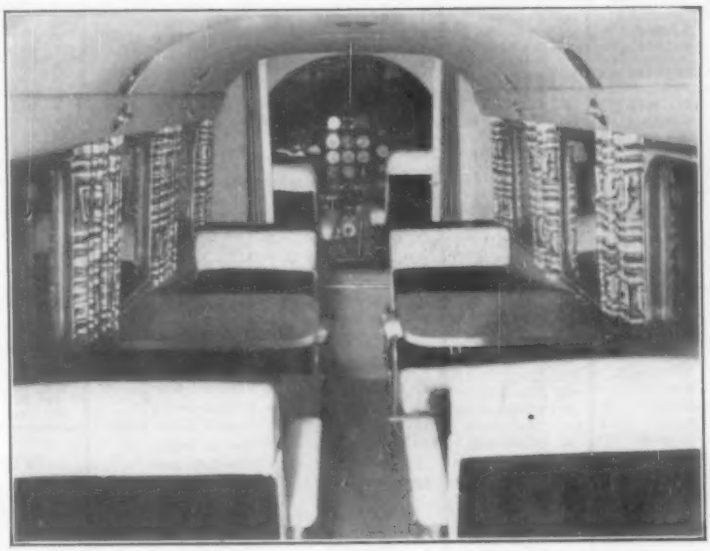

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4	SP2-1048-75	2	7-2947-75
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23	PL2-1848-77	120	PL8-444-6
127	PL2-2547-75	39	8-1540-17
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620	PL2-2548-77	2	9-148-78
540	PL2-2548-78	5	9-340-23
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93	4401W	Fuel Float Switch

AIRBORNE

1	R11M6-3	Actuator
10	R170-M1	Actuator
1	R174-M6-9	Actuator Trim Control
2	R174-M6-10	Actuator Trim Control
1	R174-M6-11	Actuator Trim Control

Adel Valves and Pumps

1	AN6200-1	Valve
508	D7818-2.5	Pumps
71	D7818-5.0	Pumps
24	D8157	Pumps
237	9696	Valve
7	9696-2	Valve
4	11145-2	Valve
2	11145-5	Valve
1	12880-2	Valve
10	12880-3	Valve
106	12924-2	Valve
1	12934-2	Valve
11	17381	Valve
4	17837	Valve
4	18028	Valve
8	20448-2	Valve
8	20501-3	Valve
1	21700-3	Valve
1	22407-1	Pump
9	22601-1	Valve
14	23314-3	Valve
77	69221 (1021-5)	Valve
33	18784	Valve

BENDIX-ECLIPSE

Pieces	Part Number	Description
3	426-1E	Motor
5	426-1A	Motor
2	551-1A	Valve
1	556-1B	Valve
9	557-5C	Valve
384	564-2A	Oil Separator
52	578-3A	Valve
3	610-2	Valve
8	610-2C	Valve
71	612-3A	Valve
140	612-4A	Valve
4	659-2	Oil Separator
1	659-2A	Oil Separator
214	716-3A	Generator
3	800-1C	Inverter
1	800-1D	Inverter
5	813-4	Valve
3	847-4A	Valve
2	847-8A	Valve
1	1011-2A	Valve
71	1003-4	Generator
8	1181	Valve

AIRCRAFT RADIO

Pieces			
20	TA-12B	Bendix	Transmitter
30	RA10-DB	Bendix	Transmitter
748	1C-200	General Electric	Noise Filter
959	NF 10084	General Electric	Noise Filter
1	415A	Hewlett Packard	Standing Wave Indicator
26	MS49A	Bendix	Antenna Switch
518	MT48C	Bendix	Insulator
81	3616	Bendix	Control
22	3620	Bendix	Station Box

ECLIPSE-PIONEER PARTS

Pieces		
134	3801-3B	Fuel Quan. Gauge
18	15701-1A	Trim Tab Controller
64	CQ-9	Clutch Switch
73	1416-12	Starters
100	NEA-3	Generator
393	564-2A	Oil Separator
9	2277-11-D3A	Dual Electric Tachometer
29	NEP-2	Aux Power Unit
130	612-4A	Valves
9	557-5	Valves

LEAR

ACTUATORS

Pieces		
4	157-BG-1	
2	164 BK	
1	164 CUL-1A	
1	164-DP1	
4	164-DP4	
1	164-DP5	
12	189W	
161	420 DY	
159	420 EC	
1	M8684-(440-AN1)	
1	M8691-(440-AP1)	

SCREW JACKS

14	550-CG
22	550-DJ
1	562 E
2	563 ER
1	563-E4
6	577-P

COUPLINGS

8	730 AL
11	732 A
40	735 A
14	740 A
35	744 A
4	760 A
38	761 A

PUMPS

129 MF9-713-15H-(Vickers)

134 PF12-713-25BCE (Vickers)

127 PF4-713-20BCE (Vickers)

33 MF45-3911-29Z (Vickers)

6 610-2C (Eclipse)

AIR CONDITIONING

Pieces	Part Number	Description
6	83A94	Surface Combustion Heater
2	C97A49	Surface Combustion Heater
7	C97-A28	Surface Combustion Heater
185	921-8	Stewart Warner Heater
9	CO50A	Air Engineering Blower
3	A28A8640	Joy Blower
5	AFB129-100	Hoover Blower
18	4582-A-A-6C	Dynamic Air Engineer Blower
358	2301 0N	Thomas A. Edison Thermostat
10	3094	Barber Colman Thermostat
1	AR5519	Thermostat
10	FYLD2516	Thermostat
35	LD10W	Thermostat
126	17322-2	Fenwal-Thermoswitch
4	184230-0	Fenwal-Thermoswitch
20	18522-0	Fenwal-Thermoswitch
3	17322-1	Fenwal-Thermoswitch
261	1033-4E1	White Rodgers-Heat Control switch
22	A55A00	Surface Combustion Heater Ignition Unit
12	468361	Vapor Car Heating Temperature Compensator

AIR CONDITIONING

Pieces	Part Number	Description
36	9804B	Vapor Car Heating Control Box
49	715E	Fulton Syphon Temperature Control
1	03C-10	Surface Combustion Heater Ignition Unit
130	PG208AS7	Minn. Honeywell Air Ram Switch
9	PG208-AS1	Minn. Honeywell Air Ram Switch
22	17343-6	Thermoswitch
22	18422-0	Fenwal Thermostat
13	954-A	Thermoswitch
3	PG208-AS13	Air Ram Switch
20	M101B	Aerotec Pressure Switch
5	M102	Aerotec Pressure Switch
349	M826	Aerotec Pressure Switch
9	4510-1	Aerotec-Air Vent
35	SW470544A	Stewart Warner Valve
18	SW472083	Stewart Warner Heat Exchanger
2	G475015	Stewart Warner Valve
1	81075	Aireserach-Turbine Heat Exchanger
4	17320-12	Fenwal Thermoswitch
4	18423-0	Fenwal Thermoswitch

WHEEL ASSEMBLIES

Pieces	
9	36 X 11 (AM-1) (10-4900033) Mnf. by Hayes—Complete with tire and tube
4	12.50 X 16—Type III—(540063) Mnf. by Goodyear—Complete with tire and tube
13	28-H-3005-5—L/R PBY Beaching Gear with tail wheel
51	Model 3—Hyd. Bomb and Torpedo Truck 2500 lbs. Capacity—Mnf. by Manley
97	D2-540-1 (7½) Brake Assy.
8	Model—AA16801 A—Vickers Hydraulic Transmission

AIRCRAFT ACCESSORIES

9	014016-S1-16	Disconnect Coupling
166	38QD1800B	Allen Disconnect Coupling
371	5QD1800B	Allen Drop Tank Valve
132	8QD1800B	Allen Drop Tank Valve
47	142-S2-4	Aeroquip Hyd. Coupling
10	9530493	Westinghouse Air Brake Valve
2	820641	Air Brake Valve
3	401473-3	Bendix Valve
3	401856-3	Bendix Valve
111	10-55085-1	Bendix Filter Unit
8	AA37001	Vickers Valve
465	417033	Wright Crankcase Stud Assy.

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other situation would result in chaos."

USAF's proposal to limit the Civil

engage in airline operations. Of 1,000 shares of stock authorized, 300 have

thansa Lines or Lufthansa German Airlines in United States operations as

Rizley Backs Subsidy Rights For All Lines

Mail certificate requisite now outmoded, CAB says; ATA claims plan would 'start subsidy program again.'

By Katherine Johnsen

Civil Aeronautics Board recommends that all carriers—not just those certificated to transport mail—be made eligible for subsidy.

CAB Chairman Ross Rizley, in a report to Senate Commerce Committee, argued that the provisions of the 1938 Civil Aeronautics Act making a mail certificate the prerequisite for subsidy is now outmoded.

He said:

"The mandatory relationship between mail and subsidy reduces the flexibility; on the other hand, national defense considerations have risen greatly in relative importance, and it may well be that certain carriers who are not certificated to carry the mail may be required to be subsidized in the public interest for national defense reasons."

Air Transport Assn.'s counsel, Stuart Tipton, denounced the proposal with the comment that "it would just start the subsidy program all over again."

Legislation Outlook

Meanwhile, the prospect for some definite congressional action at this session on comprehensive civil aviation legislation increased:

• **Sen. Warren Magnuson,** chairman of Senate Commerce Committee, said that the aviation subcommittee, headed by Sen. Mike Monroney, would recommend omnibus legislation to the full committee within two weeks. The subcommittee has held hearings on measures introduced by Magnuson and Sen. John Bricker, former chairman of the committee (AW Mar. 28, p. 84).

• **Rep. Percy Priest** anticipated that the House Commerce Committee, which he heads, would be ready to open hearings on similar measures.

New CAB Policies

Other policies advocated by CAB for the first time were:

• **Airlines,** once off subsidy, should not continue to be eligible to receive it. CAB believes, Rizley declared, "That subsidy is developmental in nature, and that once the carrier has passed beyond the developmental state, he should not remain eligible for subsidy." Tipton complained that it is impossible to establish a fair yardstick as to which carriers should be cut off subsidy eligibility.

"This would penalize lines that achieved self-sufficiency—and discourage it," Tipton said. "Carriers might think twice before getting off and getting thrown out the window. How can a line know that its business will never, in the years to come, take a turn for the worse?"

• **Non-subsidized carriers** should not be permitted to abandon services—without specific authorization from the Board.

• **Carriers** should have a "right" to subsidy if it is approved in a quasi-judicial proceeding. Under the Magnuson and Bricker bills, it would be discretionary with CAB whether to grant subsidy—merited or not. This "would mean in effect that the carrier would not be in a position to compel the payment of subsidy regardless of his proved need," Rizley objected. "We think that both the subsidy standards as well as the subsidy policy of the government should be laid down in legislation, administered by the Board with all the protections of the quasi-judicial process."

• **Long-term subsidy contracts** permitting carriers to know their income and the government to know the price in advance—were opposed by the Board. This approach is not consistent with the quasi-judicial process, Rizley stated. If a carrier has a justifiable need in excess of its contract, Rizley said, presumably the government would not let the line go bankrupt. But, should the contract method be adopted, Rizley argued that the government should be authorized to recapture 100% of excess profits at the end of the contract term. "The Board believes that while a subsidized carrier is entitled to a fair return on its investment, it is not entitled to excess profits," he said.

As incentive to carriers to cut costs, the Magnuson and Bricker bills provide for only a 50% recapture.

Oppose Military Plan

Both Rizley and Tipton opposed proposals by the Air Force exempting military air operations from civil control. The proposals were submitted to the committee on behalf of the Department of Defense.

"Should the military, as they now insist, be given the right to fly as they please without limit, an intolerable situation could exist," Rizley protested.

There is "a compelling necessity that all users of the airspace operate aircraft in accordance with fixed and known rules," he said. "Because of the speeds and flexibility of operations involved, these rules must be uniform throughout the U. S."

Rizley pointed out that a pilot in a single day "may cross a dozen or so states, on an off civil airways, in the vicinity of scores of civil and military airports, in proximity to scheduled airline aircraft, irregular carrier aircraft, military aircraft of all descriptions, crop dusters, business aircraft and private aircraft of all types. He must be able to rely at all times on other aircraft flying in accordance with the same air traffic rules as he is—any

Single-Engine Convair 340

Sugarloaf Mt. provides backdrop for Cruzeiro do Sul Convair 340 as it skims over Rio de Janeiro's municipal airport during single-engine takeoff tests. Powerplants are Pratt & Whitney R2800s. Two other airlines flying out of Rio use Convairs: REAL, which recently ordered two 340Bs (AW May 16, p. 7), and VARIG, which flies 240s.

other situation would result in chaos."

USAF's proposal to limit the Civil Aeronautics Administrator's authority to "civil" facilities, Rizley complained, could "effectively block any real common civil-military system of air navigation."

Tipton considered the proposal "wholly unwarranted and one which could completely reverse the policy which both the government and the industry have been endeavoring for years to carry out. . . . Vigorous efforts and enormous expenditures of time and money have been committed to a 'common system' program. What the Defense Department now seems to be proposing is that the objective be abandoned," he said.

Rizley and Tipton also objected to these USAF proposals:

- **Permit USAF** contract carriers to make trips without regard to their basic authority from CAB.
- **Authorize USAF** to make emergency airlift contracts without regard to rates filed with CAB.
- **Permit** military personnel to repair civil aircraft without regard for Civil Air Regulations.

Direct Erie-Detroit Route Under Study

Civil Aeronautics Board will investigate the need for direct local service between Erie, Pa., and Detroit.

The Erie-Detroit Service Case is based on an application of the Erie Municipal Airport Authority for service between the two cities. Subsequently, Allegheny Airlines, Mohawk Airlines, Lake Central Airlines and North Central Airlines asked that various applications be consolidated with the Erie-Detroit case.

CAB has included applications of all four local service carriers, but has severed parts of the applications which didn't apply directly to the route, confining the case strictly to Detroit-Erie service.

DC-4 Deal Approved For Eastern, Slick

Eastern Air Lines and Slick Airways have received exemption authority from the Civil Aeronautics Board to lease DC-4 aircraft from Aero Leases, Inc.

Aero Leases was incorporated two months ago and bought ten DC-4's from Eastern.

Eastern is leasing five of them back for a year, and Slick is leasing three for three years.

Aero is empowered under its incorporation to buy, lease, charter or otherwise acquire aircraft, but it cannot build or operate them, nor can the company engage in airline operations. Of 1,000 shares of stock authorized, 300 have been issued.

Of these, 100 shares are held by Standard Factors Corp., 100 by Intercontinental Financial Corp., and 25 each by R. R. Hart, J. B. Lewin, James Fischgrund and Stanley D. Weiss.

In its order, CAB notes that Hart, Fischgrund, Lewin and Weiss are involved in both Aero Leases and the North American Airlines group. The Board specifies that its decision to issue exemptions to Slick and Eastern shouldn't be construed as approval or authorization of the relationships.

Lights Test Extension Favored by Board

Continued experimentation with lights on transport aircraft is favored by the Bureau of Safety Regulation of the Civil Aeronautics Board in a proposal to extend its special regulation on the subject.

CAB wants to extend the authority in special Civil Air Regulation SR-392 to June 30, 1960. The present regulation, which expires at the end of this month, was adopted Apr. 9, 1953 to permit experiments with a limited number of aircraft on position light and anti-collision light systems.

The proposed special regulation, which would replace the present one, would permit air carriers to experiment with lighting projects while operating in scheduled or other service. Approval of the Civil Aeronautics Administrator would be necessary, and he would have the responsibility of prescribing conditions and limitations needed to insure safety and avoid confusion in air navigation.

Lufthansa Is Given CAB Carrier Permit

Operation of Lufthansa, the new German airline, between Germany and the United States has been approved by Civil Aeronautics Board and President Eisenhower.

CAB has issued a foreign air carrier permit to the carrier which authorizes transportation of persons, property and mail between a point or points in Germany and New York via Shannon and Gander.

The permit is good for a year or any further period provided for when a bilateral agreement is reached between the United States and the Federal Republic of Germany before that time.

The German carrier is permitted to use any of three suggested names in place of its German title, Deutsche Lufthansa Aktienge-sellschaft. The company can call itself Lufthansa, Lufthansa Lines or Lufthansa German Airlines in United States operations as long as it includes all names under which it operates on its ticket stock and CAB reports, and displays them prominently in the passenger compartments of its aircraft.

Seattle Homeowners Sue Port of Seattle

Seattle—Homeowners near the Seattle-Tacoma International Airport are suing the Port of Seattle and six airlines for $1,289,726. In effect, the 24 plaintiffs charge, their property has been condemned because of aircraft noise and low-flying planes.

The homeowners say airplanes fly over their houses at 100 ft. This will be even lower, they claim, when the Port of Seattle carries out its plan to extend north-south runway.

Because of these conditions, the suit charges, banks and the Federal Housing Administration will not grant or guarantee loans to buy or build homes in the vicinity.

SHORTLINES

► **Icelandic Airlines** inaugurated weekly direct service between New York and Luxembourg. Fares for the all-tourist service are $281.50 one way and $507.10 round-trip.

► **North American Airlines** started nonstop service between New York and Detroit with four flights a week.

► **North Central Airlines** carried 28,633 passengers in April, a 45% increase over April 1954. Load factor increased from 43% to 48%.

► **Swissair** reported first quarter air freight traffic increased 27% over the first three months of 1954.

► **Transocean Air Lines** reported a 90% increase in West Coast-Hawaii passenger business in first quarter 1955 over the same period of 1954.

► **Trans World Airlines** started nonstop service between New York and San Francisco June 1 with Super G Constellations.

► **VARIG** airlines of Brazil plans to inaugurate direct New York-Ciudad Trujillo service this summer with Super-G Constellations on its New York-Buenos Aires route.

► **British Overseas Airways Corp.** plans to put the Vickers Viscount transports on its Miami-Nassau route this year.

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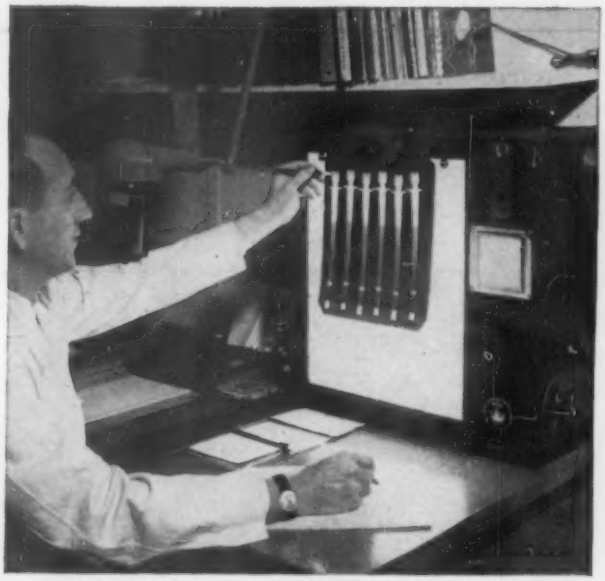

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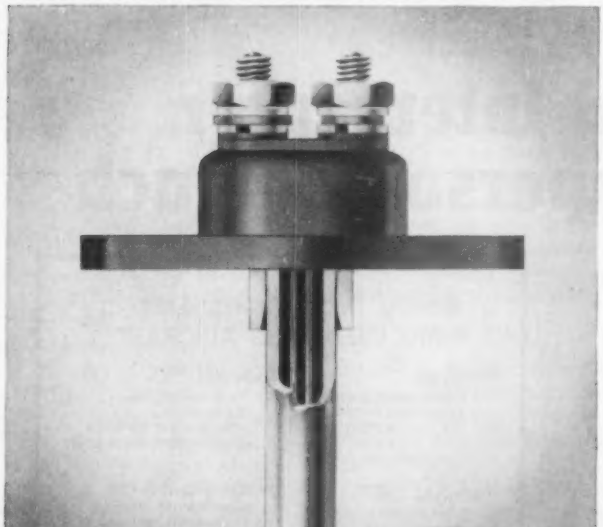

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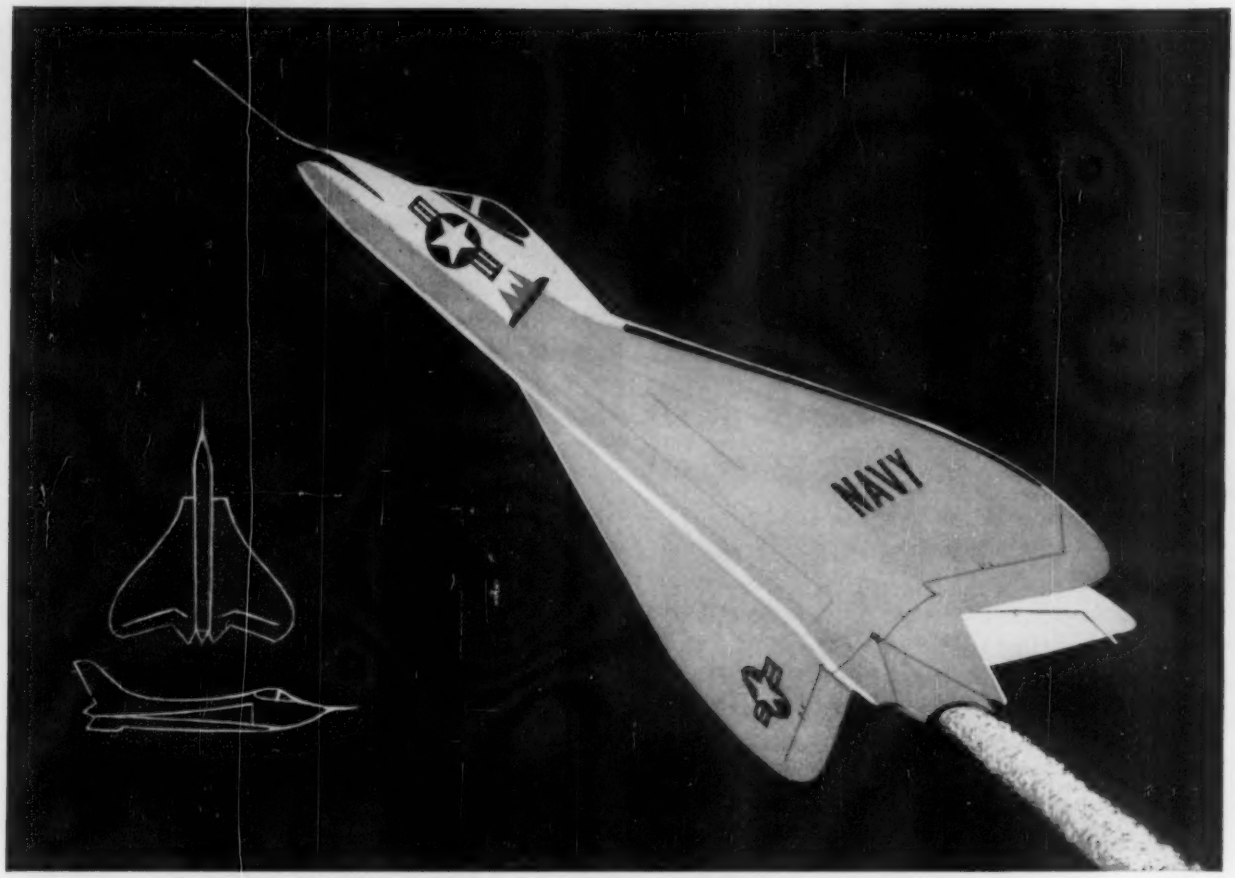

U. S. NAVY F4D SKYRAY

Navy batwinged interceptor gives carriers a supersonic punch

First crack out of the barrel, the production model F4D broke the sound barrier *in level flight*. A top performer, the plane is plenty hot at climbing, too.

A Pratt & Whitney Aircraft J-57 turbojet engine in the 10,000-pound thrust class lifts her from a carrier deck. An after-burner increases the power tremendously.

The Skyray is now in production at the Douglas Aircraft Company. Like other jets, the speedy batwinged plane has many parts made of Inco Nickel and Inco Nickel Alloys.

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Customer Is King in West Coast Battle

By William J. Coughlin

Los Angeles—Champagne and orchids are paying off for Western Air Lines in its battle with United Air Lines for first-class traffic on the Pacific Coast.

Western executives estimate that more than 20% of the carrier's increase in traffic this year is due directly to its so-called "Champagne Flights."

Seeking a name flight, Western first titled its super-de luxe flight the "Californian." The public, however, quickly hung the name Champagne Flight on the service.

This has caused no little discomfort to United Air Lines, which now has added champagne on some of its flights to meet the Western competition.

"Would you like to take our champagne flight?" a UAL reservation clerk asked a customer not long ago on the phone.

"I thought I was talking to United Air Lines," the customer replied. "Is this Western?"

Western finds that 93% of the passengers on its champagne flights accept the sparkling treat. This is a much higher percentage of drinkers than for hard-liquor flights.

Festive Touch

"People consider champagne something for a festive occasion and it's more socially acceptable," a Western official points out. "You have to realize also that for many people, a flight in an airplane very definitely is a special occasion. The champagne adds a nice touch."

The majority of Western's first-class flights, more than 12 a day, now have champagne service. Only flights lacking it are early morning flights and those too short to make it practical.

United is depending more upon cocktails than champagne to meet the Western competition for thirsty passengers. It is no secret in the industry, however, that UAL would prefer not to serve any alcoholic beverages whatever on its flights. Of its 12 first-class flights out of Seattle, for example, United serves drinks only on the dinner flights and its de luxe DC-7 nonstop luncheon flight to Los Angeles. UAL President William Patterson is against mixing airplanes and alcohol.

"We serve cocktails only to meet the competition," says one United official frankly.

United serves its drinks in rugged 4-oz. portions. This is in the hope that one drink will therefore satisfy the passenger. "We don't want our stewardesses becoming bartenders," a UAL official explains. United also doesn't want any bartenders—and their unions—getting any ideas about becoming flight attendants.

FLYING HIGH—WAL woos Pacific traffic with champagne, UAL banks on cocktails.

But there is more than champagne in what Western calls its "California package."

"These are flights for the guy who always wants the best in transportation—and it's a big market," says Arthur F. Kelly, Western's vice president-sales. "The treatment begins with the way the customer is handled on the phone when he makes his reservation and continues when he arrives at the airport."

Western offers its champagne flight passengers a seat-selection system that enables them to sit where they prefer. This, it developed, has the added advantage of attracting travel-wise passengers to the airport earlier, thereby spreading out the rush at the check-in counter. Since seats are reserved, it also reduces the crush at the gate.

Just Like Home

Stewardesses are selected for the flights on the basis of personality and training. They are coached to serve the champagne "just as you would at home."

"You don't serve a guest in your home one drink and then forget him," Kelly points out. The champagne glasses are kept full.

Dinner on the "Californian" includes a 5.6-oz. filet mignon of the best grade available. It is served in a plastic tray of new and more convenient design and with crisp, clean linen. The flight is topped off with Vanda orchids and perfume for ladies and cigars for men.

"It's not only the champagne, it's a combination of a lot of the little things that makes the flight popular," says Vice President Kelly.

In establishing the service, the airline has created a problem for itself. Customers accustomed to the de luxe service are much more inclined to complain when something goes wrong.

"It has become such a high standard of service that we must face up to the problem of maintaining it that way," says Kelly. This means Western employes have to work harder. But Western officials in Los Angeles, San Francisco and Seattle told AVIATION WEEK that the champagne flight has been a tremendous morale-booster for the airline's employes.

Side Benefits

This premium service has turned up a number of side benefits for the airline. The California Wine Growers Assn. has assisted Western in boosting the flight, citing the airline for its promotion of California products. The airline serves only Italian-Swiss Colony California champagne, of private stock and with a special label.

The Cigar Institute of America stepped in to help settle a dispute on which cigar would be passed out and then joined in promotion of the flight.

The perfume given away is one of the finest of French perfumes, specially packaged for Western Air Lines. When male passengers ask for a vial for their wives or girl friends, they are asked by the stewardess for their business card, with the promise that the perfume will be mailed to them. This not only serves as a later reminder of a pleasant flight but also gives Western a chance to follow up with sales calls.

Western has no intention of reducing emphasis on its tourist flights, but the airline is bringing first-class air travel to the attention of the public with a promotional campaign—and in-flight service to match it—that is tops in appeal.

Airwork Expands Cargo Service, Calls Britannia Next Freighter

By Gordon Conley

Airwork Atlantic is expanding its routes and increasing flight frequencies after only three months operation of scheduled all-freight service between the United States and Europe.

The air carrier also is looking beyond its present leased transports and new equipment on order to bigger, faster freighters—all-cargo versions of Bristol Aeroplane Co.'s Britannia.

'Solid Route Pattern'

Britain's invasion of the U.S. airfreight market started early this year after President Eisenhower and the Civil Aeronautics Board granted Airwork Ltd. a trans-Atlantic all-cargo permit. To operate the service, the subsidy-free British airline set up Airwork Atlantic as a wholly-owned subsidiary.

The new line inaugurated operations Mar. 1 with two weekly roundtrips over a 11-city system: New York/Montreal, Gander, Keflavik, Shannon, Glasgow, Manchester, London, Frankfurt, Zurich and Basel, Switzerland.

Last week Airwork Atlantic extended its European route to Dusseldorf and began preparing for service to Milan when the British government completes negotiations with Italy for landing rights. Similar negotiations are under way for additional cities in Germany.

Route extension came after the airline increased scheduled flights to three roundtrips a week. "As soon as we got our feet on the ground, we added a third flight," said John E. Muhlfeld, president of Airwork Atlantic. "This is a pretty solid route pattern, and we needed more frequency."

Next Airfreighter

The carrier now lifts North Atlantic freight on a Douglas DC-6A leased from Slick Airways and two DC-4s from Transocean Air Lines. The U. S. airlines also provide the crews (AW Feb. 7, p. 94). British pilots will take over the DC-6A within the next 60 days.

In January 1956, Airwork Atlantic will receive the first DC-6A of three on order and begin phasing out the leased transports. But the airline probably will sign a new agreement with Slick and Taloa to provide additional freighters needed to back up the Liftmasters.

Airwork Atlantic Liftmasters will be equipped with seat tracks and galleys, allowing quick conversion to passenger configuration for charter flights—the parent company's primary source of revenue.

Meanwhile, Airwork Ltd. is negotiating with Bristol for an all-cargo version of the Britannia but has met opposition from the builder on configuration. One major issue is the size of the proposed freighter's hatches, with Airwork arguing for larger cargo doors than Bristol wants to build.

Optimistic Outlook

"This is the next foreseeable freighter for Airwork Atlantic," said Muhlfeld, "if and when Bristol agrees to meet our specifications. Preliminary studies indicate the Britannia will lower our break-even figures considerably."

The scheduled trans-Atlantic airfreight service now operates at a loss. But Airwork Atlantic expects to start breaking even by the end of this year. To do this, the carrier must reach a load factor of better than 60% with its present equipment.

Between Mar. 1 and May 23, the load factor averaged 43%. The first DC-6A to lift a full 24,000-lb. payload took off from New York May 14.

Total available cargo capacity during the first 12-month period is figured at approximately 5.2-million lb. for 145 flights.

Company officials are optimistic about the chances of increasing cargo volume to a point where the operation will begin to pay off. By depending on airfreight forwarders, the line is achieving regularity in the flow of shipments assigned to its transports.

Spillover Service

"We get 90% of our business from forwarding agents," Muhlfeld said. "And we'll continue to depend on productive forwarders. They give us coverage over the entire United States, Canada and Europe."

To supplement its normal volume, Airwork Atlantic is trying to convince North Atlantic passenger airlines it can operate as an auxiliary and carry their spillover. Cargo agreements with the larger carriers would work two ways. The airfreight line would give passenger airlines any cargo it could not move within 24 hours.

"We don't compete with passenger airlines," said Airwork Atlantic's president. "And we're in a position now to move passenger baggage as freight—a service they can fall back on during the peak summer tourist seasons. Of course, the guts of our business always will be bulk cargo."

The company has a cooperative working agreement with British Overseas Airways Corp. In addition to exchange of cargo, the airfreight line temporarily uses BOAC's facilities and manpower at New York's Idlewild International Airport.

Permanent facilities will be built next to BOAC's in Idlewild's proposed $60-million terminal city (AW Feb. 28, p. 87).

Global Delivery

To regular cargo shippers, Airwork Atlantic offers reserved space on its transports and round-the-world delivery.

Airwork Ltd. backs up its subsidiary's global promises with its charter fleet. On one such operation, Slick picked up a plane-load of oil company machines and lifted it to New York; Airwork Atlantic carried the cargo across the Atlantic to London; and Airwork Ltd. delivered the load to Tel Aviv. "We did it a day faster than anyone else could," said Muhlfeld, "and charged the regular IATA rates."

The airfreight line also can use the steamship offices and facilities of two owners of the parent company—Furness, Withy & Co. and the Blue Star Line.

"The company as a whole is extremely optimistic about this operation," Muhlfeld said. "We've more than met the forecasts made at the start."

Reserved Cargo Space

American Airlines is offering reserved airfreight space on five daily nonstop Douglas DC-7 flights between the East and West Coasts. Reservations will be made at no extra cost.

"Under this reserved space program," said J. D. Boylan, director of cargo sales, "a shipment leaving New York or Washington in the morning will be assured arrival in Los Angeles that afternoon."

Reservation system applies only to three daily New York-Los Angeles flights, and the Statesman service that operates twice a day between Washington and Los Angeles.

Silver City Completes 50,000 Ferry Flights

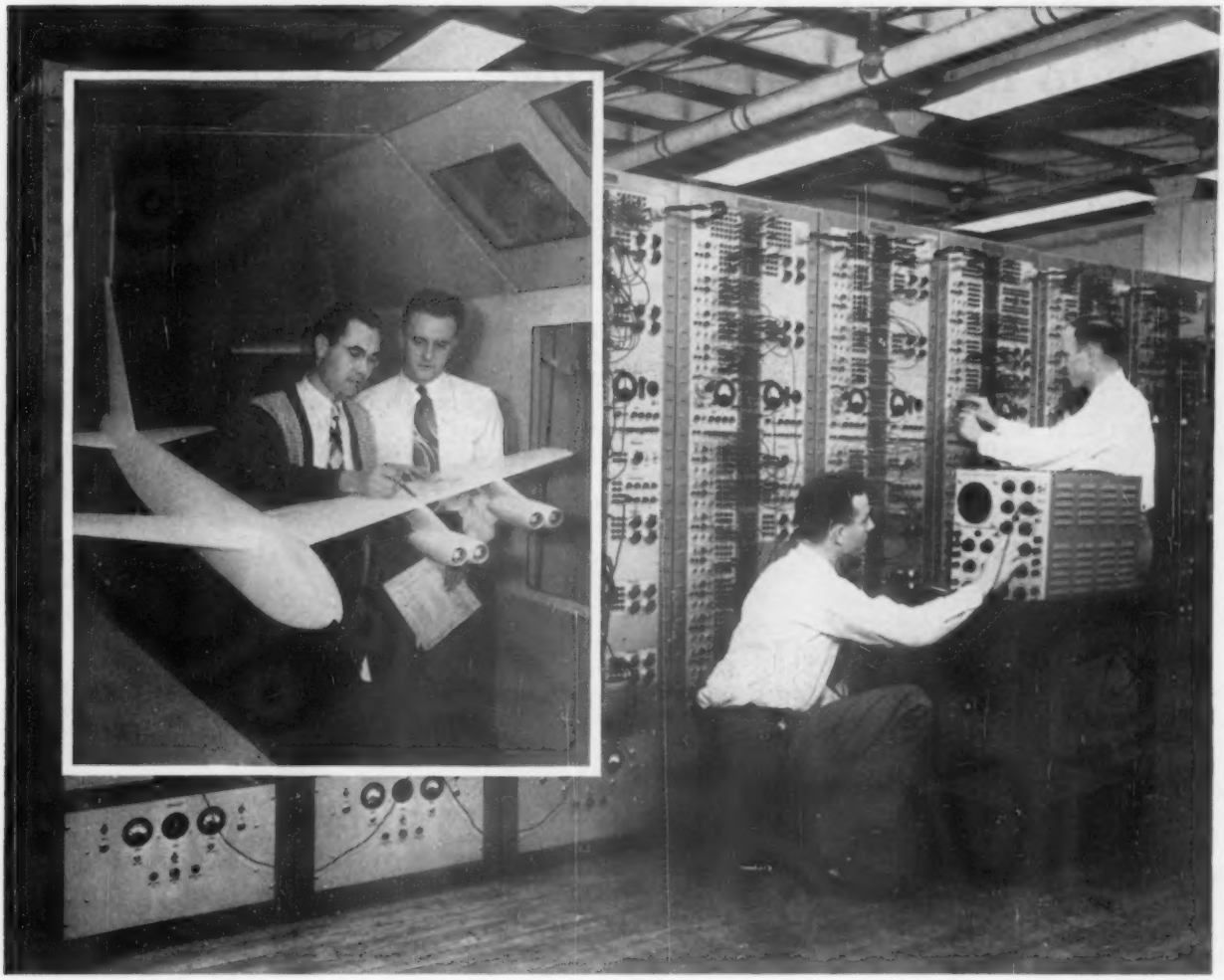
London—Silver City Airways has completed 50,000 ferry flights across the English Channel, lifting more than 113,500 vehicles and 300,000 passengers during nearly seven years of operation.

The short-haul British airline reports bookings are up 30% over 1954 and says it expects to fly 55,000 vehicles across the channel in 1955, compared with more than 42,000 last year.

In 1954, Silver City carried 30,908 automobiles, 11,541 bicycles and motorcycles and 126,000 passengers in more than 18,210 flights that covered a million miles.

CAB Urges Senate to Restore

Fairbanks Air Service an exemption to employ a pilot, subject to restrictions, until



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CAB Urges Senate to Restore Funds to Reduce Case Backlog

Civil Aeronautics Board is aiming to reduce radically its backlog of mail and route cases, but cannot do this unless funds for additional personnel are granted.

This point was emphasized by CAB Chairman Ross Rizley in urging the Senate Appropriations Committee to restore funds cut from the Board's Fiscal 1956 administrative budget by the House. He reported CAB's goal is to reduce by about half the number of pending mail cases over the coming year, and put into operation a policy of starting action on all route cases not later than 18 months after applications are filed.

The Board is asking for a Fiscal 1956 budget of $4,125,000—an increase of $348,000 over the Fiscal 1955 budget. The increase is to step up the handling of mail cases ($100,000), route cases ($98,000), and audits ($150,000). The House authorized an increase of only $123,000 for the audits program, in the hope that this would lead to reductions in subsidy claims by carriers.

But Rizley emphasized that actions on mail and route cases also bear directly on subsidy.

Mail Cases

"The thoroughness and dispatch with which the Board can process mail rate cases will have more to do with the amount of subsidy than any other single thing," Rizley told the Senate committee.

The present picture: The Board had a carry-over of 71 mail rate cases at the beginning of Fiscal 1955, which, with 51 new cases, makes a total of 122 for the year. An estimated 60 cases will be disposed of during the year, leaving a carry-over on July 1 of 62 for Fiscal 1956—slightly less than the carry-over of a year ago.

If the money for additional personnel is granted, Rizley said, the Board hopes to reduce the carry-over into Fiscal 1957 to 37 cases—about half the carry-over the Board anticipates on July 1.

It expects to dispose of 72 of the 109 cases that will be up for action—the 62 carry-over and an anticipated 47 new cases.

Route Cases

On route cases, Rizley testified, "Our ability to become current is a matter of grave concern to the Board. It is the route authorization that establishes in the first instance a carrier's entitlement to subsidy."

As of Mar. 1, he reported, the Board had more than 850 applications pending. Over one-half of the total—or 445—were more than three years old; 215 were a year and a half to three years old; only 195 were less than a year and a half old.

"The failure to process an application in reasonably timely fashion can have the same effect as denial of the statutory right to a hearing," Rizley observed, "and it is hardly conceivable that Congress contemplated any applicant would be required to wait more than three years for action on his case."

The Board now averages action on 130 cases a year. "At this rate," he added, "it would require several years to dispose of just the dockets now pending."

He considered the Board's goal of starting action within 18 months after filing "a very conservative objective."

To give the committee perspective on the Board's administrative load, Rizley reported that during the first half of Fiscal 1955, in addition to mail and route cases and audits, the Board took these actions: issued 414 orders; processed 8,558 tariff filings and 1,043 service agreements; disposed of 266 economic enforcement proceedings; made 91 accident investigations; issued 31 civil air regulations; acted on 11 cases in litigation.

CAB ORDERS

(May 19-25)

GRANTED:

Braniff Airways an exemption to provide free transportation to two technical representatives of United Aircraft Corp. for purposes of in-flight observation, for 60 days.

Transocean Air Lines an exemption to perform eight flights from New York to London between July 17-27, 1955 and return from Amsterdam to New York between Aug. 15-31, 1955 pursuant to a contract with Watchtower Bible and Tract Society.

Pan American-Grace Airways an exemption to permit the carrier to serve La Paz, Bolivia and either or both Antofagasta and Santiago, Chile, on the same flight, until 60 days after decision in an investigation of Panagra's service to several points south of La Paz.

Leave to intervene in the helicopter air service certificate renewal case to the City of Gary, Ind., Gary Board of Aviation Commissioners, Gary Chamber of Commerce, City of Kenosha, Wis., Kenosha Chamber of Commerce, City of Racine, Wis., and Racine Chamber of Commerce.

Dayton, Ohio, Chamber of Commerce leave to intervene in the air freight renewal case.

Fairbanks Air Service an exemption to employ a pilot, subject to restrictions, until 60 days after decision in the investigation of inter-Alaska air services proceeding.

Edwin James Cessnun an exemption to employ a pilot, subject to restrictions, until sixty days after decision in the investigation of inter-Alaska air services proceeding.

Flying Tiger Line an exemption to perform eight round-trip charter flights between New York and Europe pursuant to contracts with the Chicago Teachers College, the Pennsylvania YMCA, George Pepperdine College, the Board of World Peace, Methodist Churches of the United States and the Civil Aeronautics Club. Charter applications for the World Travel Exchange and the International Research Fund are deferred until further order of the Board.

British West Indian Airways, Ltd., Caribbean Atlantic Airlines, Delta Air Lines, Eastern Air Lines, IBERIA, the Spanish airline, Pan American World Airways and Riddle Airlines permission to serve San Juan, P. R., through Puerto Rico International Airport.

Ozark Air Lines permission to serve Clarksville - Ft. Campbell - Hopkinsville through Outlaw Field.

ORDERED:

Pan American-Grace Airways' authorization to suspend service at Chiclayo, Peru, and Salta, Argentina, be extended until 60 days after decision in an investigation of Panagra's service to several points south of La Paz.

Flying Tiger Line's exemption to perform 20 flights pursuant to a contract with Watchtower Bible and Tract Society be amended to reduce the number of flights to a maximum of 16.

Suspension of certain rates filed by American Airlines, Northwest Airlines, Slick Airways, Flying Tiger Line, Trans World Airlines and United Air Lines be extended to Aug. 25, 1955 to allow additional time for investigation.

Effectiveness of certificates issued to Northwest Airlines and Pan American World Airways in the West Coast-Hawaii case be stayed until June 25, 1955, since the Board has not ruled on a petition for reconsideration.

Effectiveness of certificates issued to Northwest Airlines and Pan American World Airways in the trans-Pacific certificate renewal case be stayed until June 25, 1955, since the Board has not ruled on petitions for reconsideration.

Mail rates for Slick Airways, Flying Tiger Line and Riddle Airlines for transportation of surface mail be fixed at the temporary rate previously set for other carriers.

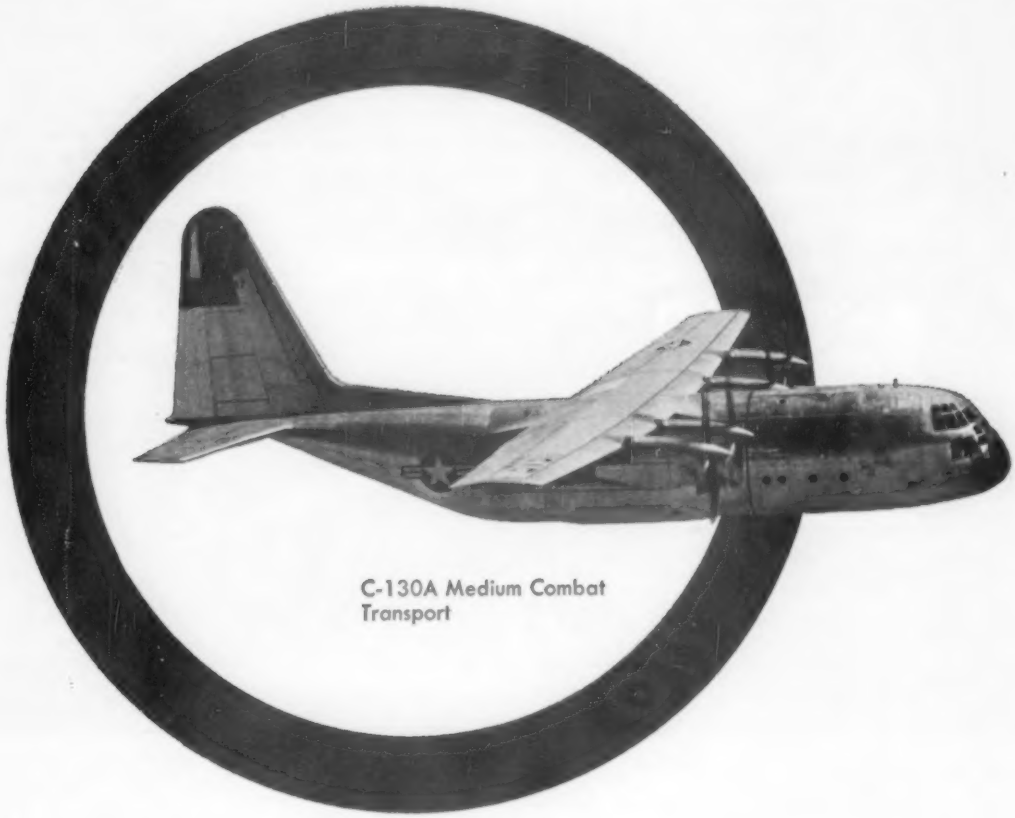
Effectiveness of the certificate issued to Ozark Air Lines in the Ozark certificate renewal case be stayed until June 23, 1955, since the Board has not ruled on a petition for reconsideration.

Allegheny Airlines' temporary mail rate be fixed at 52.40 cents for the period starting Apr. 1, 1955.

APPROVED:

Agreements between American Airlines, Capital Airlines and various other carriers relating to intercompany arrangements.

Los Angeles Airways' revision of its flight pattern to add Santa Ana and drop Long Beach on certain trips.



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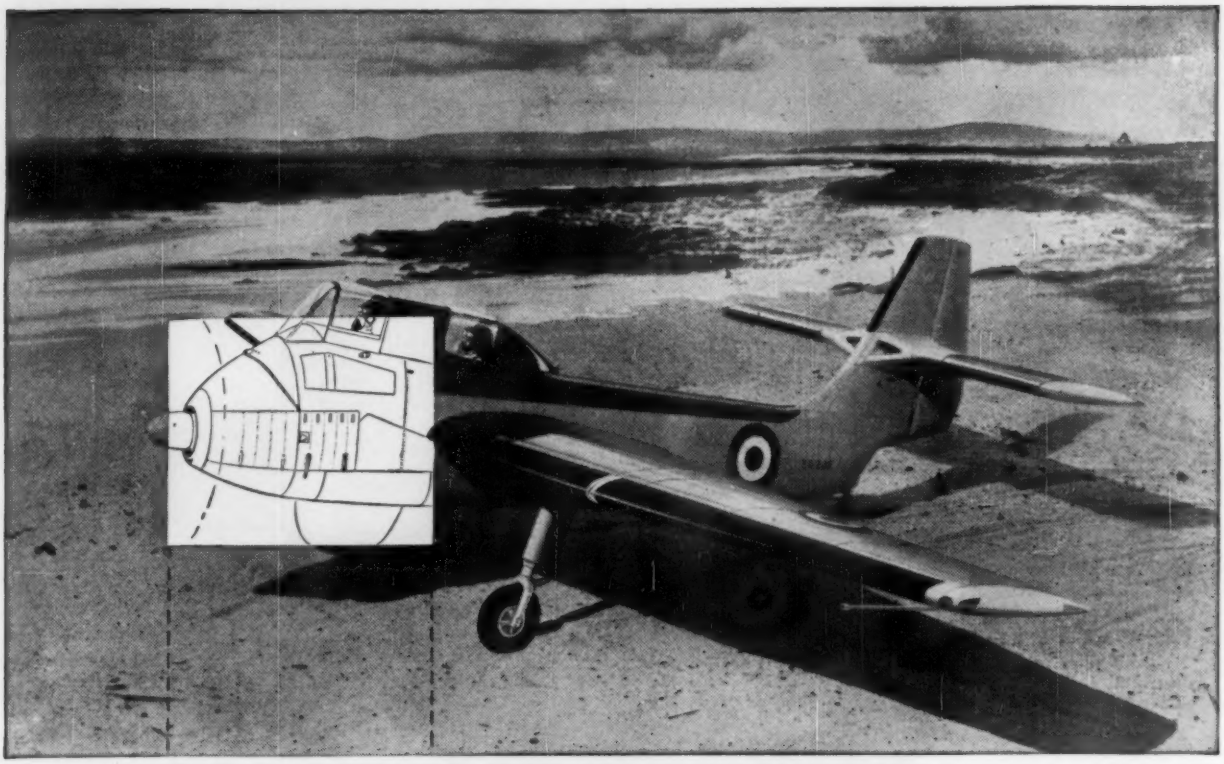

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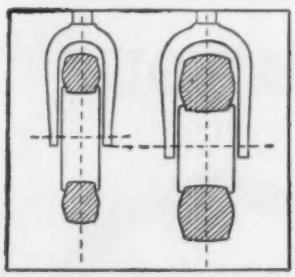

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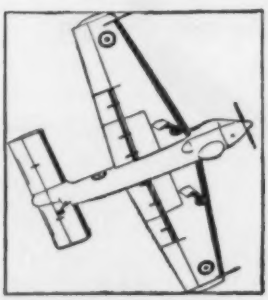

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EDITORIAL

Reversal on Russian Airpower Threat

Events in Congress, the Pentagon and the White House during the past two weeks have confirmed in every detail the facts published by AVIATION WEEK on May 23 regarding the number and type of new Russian aircraft displayed over Moscow; the significance of this rapid progress in Soviet jet airpower to the United States; and the charges made that top level civilian government officials were deliberately concealing the true facts on this Russian air show from the American people.

Since publication of AVIATION WEEK's story, "Russian Jet Airpower Gains Fast on U. S.," and its editorial, "Double Shock for Americans," on May 23, the Eisenhower Administration has completely reversed its position on the scope and significance of the growing threat of Russian airpower to this country. From a complacent attitude of "all's well" and "no changes are necessary" this administration has switched to public admission that the Russian threat is real and that it requires positive action in accelerating production of key U. S. aircraft such as the Boeing B-52 heavy jet bomber.

Here is the detailed chronology of this amazing reversal of position by the Administration:

May 13—Department of Defense releases vague and incomplete statement on Russian air display over Moscow.

May 17—Sen. Stuart Symington calls for a congressional investigation to determine whether Russian airpower is gaining on the U. S.

May 18—President Eisenhower answers Sen. Symington's charges stating "it is just not true" that we have lost technical and numerical superiority in the air "in a twinkling."

May 19—USAF Secretary Harold E. Talbott and General Nathan F. Twining, USAF Chief of Staff, reassure House Armed Services Appropriations Subcommittee that the U. S. is superior to Russia in the air. Brig. Gen. Woodbury Burgess, director of intelligence for Air Defense Command, is rebuked by Gen. Twining for stating publicly in Detroit that "the Russians have planes that are as good if not better than the U. S."

May 23—AVIATION WEEK publishes full details of Russian air display and charges top level civilian officials have concealed these facts from American people in an editorial. AVIATION WEEK's story and editorial widely quoted in daily newspapers, radio and television. Senator Symington takes Senate floor to demand that Administration either confirm or correct AVIATION WEEK statements.

May 24—Defense Secretary Charles E. Wilson confirms AVIATION WEEK's details on numbers and types of Russian aircraft shown over Moscow in an official Defense Department statement. Secretary Wilson tells his press conference there are no plans to change the aircraft production program.

May 25—Secretary Talbott and Twining testify in executive session before the Military Applications Subcommittee of the Joint Congressional Committee on Atomic Energy. Testimony reverses earlier assurances and admits Russian airpower threat is grave and U. S. action required. Senator Henry Jackson, subcommittee chairman, says proof that Russian threat is genuine will come when USAF announces it must accelerate production of B-52 heavy jet bomber and other aircraft types.

May 26—Secretary Talbott and General Twining testify in executive session before the Senate Armed Services Committee. Immediately afterwards, USAF announces a 35% acceleration of Boeing B-52 heavy jet bomber production.

May 31—President Eisenhower confirms that USAF has been authorized to accelerate B-52 production.

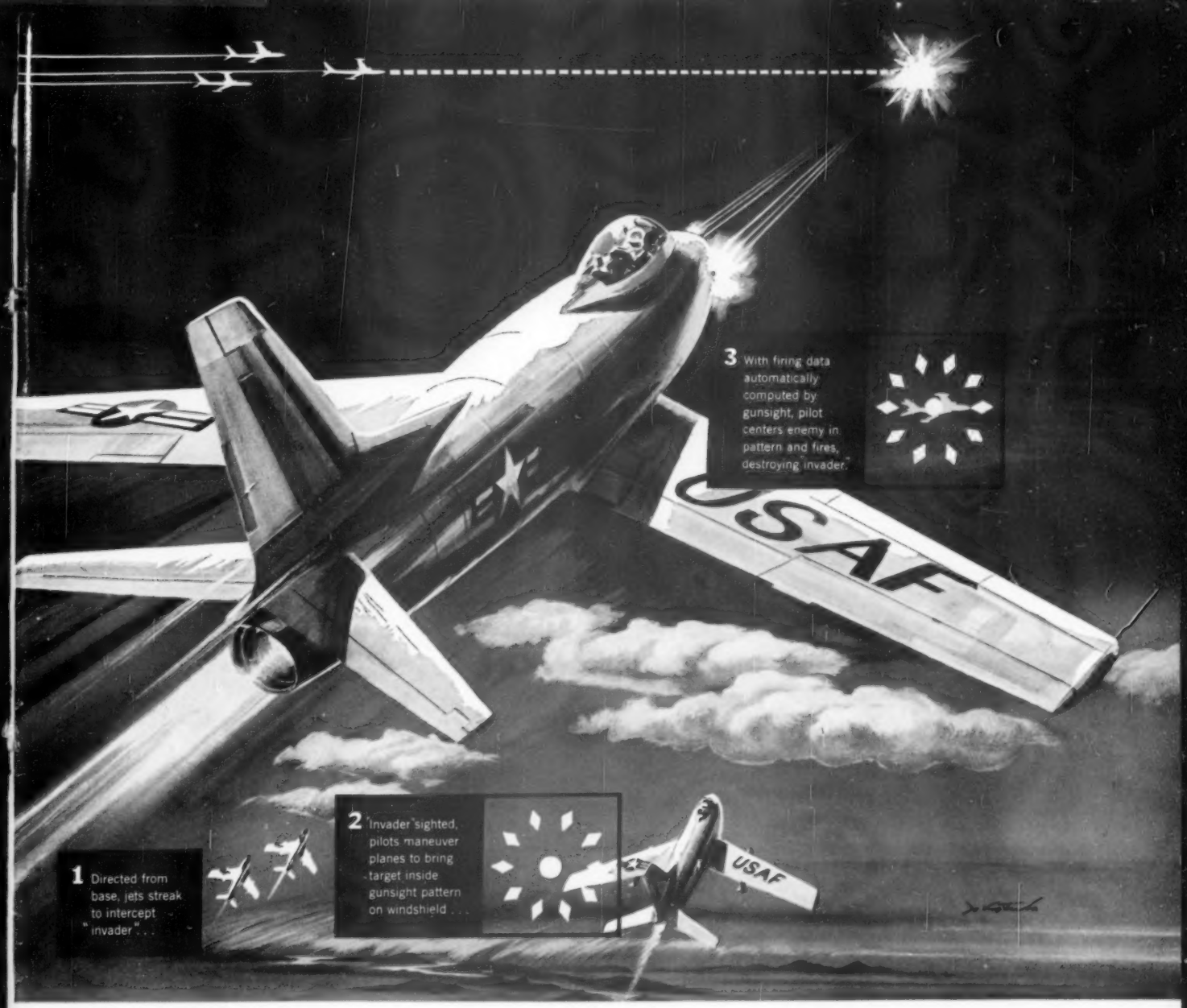
These events have indicated clearly that the top level civilian officials of the government concerned with national defense were wrong in their original attempt to conceal the true story and significance of the Russian air display from the American people and were wrong in their evaluation of the recent rate of Soviet aeronautical progress in relation to the pace of U. S. development.

Thanks to the energy and enterprise of a free press and the persistence of key legislators in the Senate the record on this score has now been set straight.

But the acceleration of the B-52 production program is only the first step in a positive, concrete program necessary to provide and maintain a significant U. S. lead in the air over our Russian competition.

The entire aeronautical research, development and production program of both USAF and the Navy must be reviewed, re-evaluated and re-vitalized to surpass the rapidly increasing pace of Russian airpower and to maintain the air superiority without which this nation will perish.

—Robert Hotz


3 With firing data automatically computed by gunsight, pilot centers enemy in pattern and fires, destroying invader.
USAF
2 Invader sighted, pilots maneuver planes to bring target inside gunsight pattern on windshield . . .
USAF
1 Directed from base, jets streak to intercept "invader" . . .

RADAR GUNSIGHT HELPS TAC PILOTS BAG "FOE"

Korean-tested Device Proves Deadly Accurate in Stopping Jet "Invaders"

THE STORY BEHIND THE STORY:

Here at home, where air defenses are constantly being strengthened, there's a good chance of detecting and intercepting hostile planes before they reach their destination. And abroad, as you've probably noticed from headlines like the one above, chances are good that aggressors would be intercepted and shot down by fighters from our overseas bases or from NATO wings.

One reason for the impressive marksmanship demonstrated by Tactical Air Command pilots, of course, is their intensive training. Another is the accuracy of the computing gunsight first used in Korea and now serving TAC and NATO squadrons. Here's what it does, in the words of General "Jimmy" Doolittle:

"In jet combat you are chasing a small and elusive speck, and you have only seconds to shoot at it. You are travelling ten miles per minute, twisting and turning; your senses can't measure the speed and range of the target or the angles involved in hitting it—and even if they could, you lack time for necessary calculations. The new gunsight does this for the pilot. He watches an illuminated circle and dot reflected on his windshield. When circle and dot are superimposed on the target, he fires."

Developed through the joint efforts of the Instrumentation Laboratory of M.I.T. under Director Dr. C. Stark Draper, Sperry, and U.S.A.F.'s Armament Laboratory—the radar gunsight is an example of teamwork at its best – providing better weapons for defense efficiently and economically.

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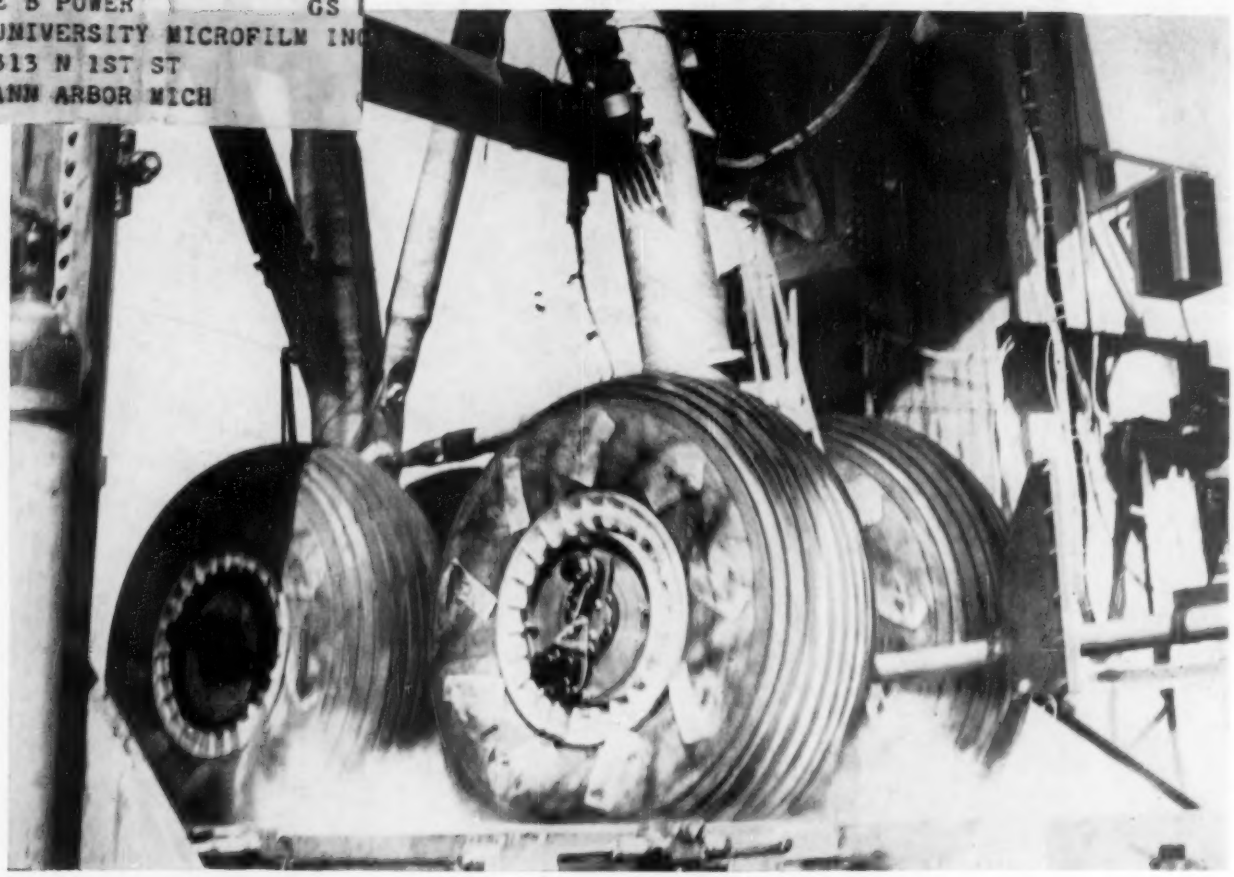

On *TWA's* SUPER-G Lockheed Constellation's landing gear . . .

Elastic Stop® nuts pass this brutal drop test

Like a bladeless guillotine, this 40-foot-high Lockheed test stand hoists landing gear assemblies aloft, spins their wheels backward 100 miles an hour, and crashes them down on its concrete base. Tons of lead weights simulate the big plane the landing gear is designed to carry.

The Lockheed experiments are directed toward development of lighter, stronger landing gear. These new units in turn demand fasteners designed for maximum resistance to fatigue failure plus the utmost dependability in terms of rated tensile performance and resistance to loosening under severe vibration and extreme shock and impact loads. Among the planes to benefit from data already secured by these punishing tests is the new Lockheed Super G Constellation, already placed in service by TWA. The Super G Connie's landing gear is only one of the many structural sections of the new plane fastened with vibration-proof Elastic Stop nuts.

Elastic Stop nuts with their familiar red locking collars have been used on every new air frame developed during the last two decades. They have performed satisfactorily under the most unpredictable test conditions . . . under normal operating conditions . . . and throughout millions of hours of rugged combat service. You can rely on flight-tested Elastic Stop nuts!

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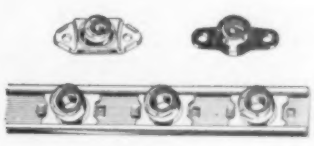
- vibration-proof locking
- thread sealing . . . no galling
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- suitability to production line assembly methods
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